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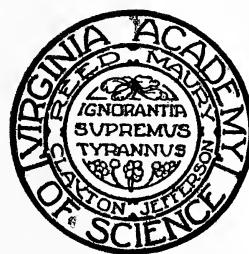
The Virginia Journal of Science

VOL. III

OCTOBER, 1942

No. 6

Virginia Academy of Science



Proceedings for the Year
1941-1942

Minutes of the Twentieth Annual Meeting

Roanoke, Virginia

May 7th-9th, 1942

The Virginia Journal of Science

Official journal
of the
VIRGINIA ACADEMY OF SCIENCE

GEORGE W. JEFFERS, *President*, State Teachers College, Farmville, Va.

E. C. L. MILLER, *Secretary-Treasurer*, Medical College of Virginia, Richmond, Va.

SIDNEY S. NEGUS, *Assistant Secretary-Treasurer*, Medical College of Virginia, Richmond, Va.

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1941-42

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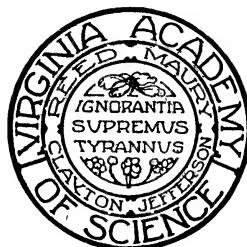
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1946

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GENERAL PROGRAM OF THE
THIRTIETH ANNUAL MEETING

ROANOKE, VIRGINIA

1942

HOTEL ROANOKE—HEADQUARTERS

Thursday, May 7

7:30 P. M. Academy Conference, Ball Room, Hotel Roanoke.

Friday, May 8

8:30 A. M. Registration, Palm Court, Hotel Roanoke.

9:30 A. M. Section Meetings, Hotel Roanoke.

12:30 P. M. Lunch.

2:00 P. M. Section Meetings, Hotel Roanoke.

7:15 P. M. Banquet, Ball Room, Hotel Roanoke.

Address of Welcome by Mr. H. Felix Sanders.

Response by President George W. Jeffers.

Presentation of the Annual Research Prize of
the Academy and the Jefferson Prize by Dr.
Frank C. Vilbrandt.

Address—Dr. W. H. Sebrell, Jr., *Chief, Division of Chemotherapy, National Institute of Health.*

Saturday, May 9

9:00 A. M. Section Meetings, Hotel Roanoke.

12:00 Noon General Business Meeting, Rooms A-D, Hotel Roanoke.

MINUTES OF THE ACADEMY CONFERENCE

The Academy Conference was called to order in the Ball Room of the Hotel Roanoke at 8:30 P. M. May 7, 1942, with the following present: D. M. Allan, Mrs. R. H. Andrews, Roy P. Ash, R. C. Berry, L. C. Bird, Isabel Boggs, Paul R. Burch, D. R. Carpenter, Alice Carroll, R. P. Carroll, Austin Clark, H. J. Davis, H. B. Derr, R. S. Edmundson, Preston Edwards, L. S. Evans, Alfred Fisher, J. C. Forbes, R. S. Freer, Pat Gaskins, J. McD. Grayson, A. T. Gwathmey, H. B. Haag, C. O. Handley, E. S. C. Handy, Mrs. E. S. C. Handy, E. S. Harlow, W. D. Hoyt, G. W. Jeffers, W. C. Jones, W. H. Keeble, L. D. Keyser, E. C. H. Lammers, Ivey F. Lewis, W. D. Mankin, A. B. Massey, R. F. McCrackan, Wm. M. McGill, M. J. McNeal, E. C. L. Miller, C. E. Myers, S. S. Negus, C. L. Newcombe, E. B. Norris, F. S. Orcutt, P. M. Patterson, H. Riese, W. Riese, R. G. Robb, J. H. Rushton, L. A. Sandholzer, T. McN. Simpson, Jr., F. F. Smith, L. H. Smith, R. L. Taylor, W. L. Threlkeld, I. A. Updike, E. K. Vaughan, F. C. Vilbrandt, O. E. White, I. D. Wilson, Mrs. R. A. Young.

Report of the President

During the past several years the Academy has been especially active: It has launched a Journal of Science, a Junior Academy of Science, and a Committee on Long Range Planning out of which has grown what has come to be known as the James River Project. Because of these several undertakings, I promised you a year ago that I would not embark on any new projects for the year 1941-42. I felt that the year could be well spent in consolidating those gains and, in the second place, I saw, as indeed all of you saw, the lowering clouds of approaching war. I felt that in times like these the Academy could do no better than to make itself strong, prepared for any eventuality.

No major committee changes have been made during the year, although it must be conceded that some committees could bear some revamping. Only one new committee was created. In accordance with a resolution passed at the general meeting a year ago, I have appointed a committee to study the matter of making "this Academy Conference an official meeting of the Academy empowered to pass finally upon matters that may come up," as well as "the whole organization and timing of our meeting schedules."

I find that as long ago as 1937, Dr. Jordan in his presidential report mentioned that the council had discussed the question of the desirability of discontinuing the reading of formal papers. Certainly it is true that reading of scientific papers often leaves much to be desired.

The original committee appointed to look into the matter failed to function due largely to the fact that the chairman was

JUL 5 1942

called to do war chemistry in Washington. In reorganizing the committee a month or so ago, I secured the consent of Dr. Edwards of Sweet Briar and a member of the council to act as chairman. Working with him on this committee are: Miss Grace Blank of William and Mary, Dean E. B. Broadwater of Roanoke College, Dr. J. Shelton Horsley of Richmond, and Dr. Garnett Ryland of the University of Richmond.

Strictly speaking, this is the second meeting that the Academy has held this year and not the first. On October 17, 1941 we met in joint session with the Virginia Manufacturers' Association in Roanoke. By invitation the Academy presented a symposium on the subject: "The Value of Scientific Research to Virginia Industry." Taking part in this symposium were: Dr. Harrison E. Howe, Editor, Industrial and Engineering Chemistry; Dr. W. S. Calcott, Director, Jackson Laboratory of the E. I. duPont de Nemours and Company; Dr. Arthur Bevan, Geologist for the Virginia Geological Survey; and Mr. D. J. Cederstrom, Groundwater Geologist of the United States Geological Survey. Mr. H. K. McConnell of the Tobacco By-Products Corporation was to have been one of the participants but was unable to attend.

As far as I know this is the first instance of a state academy of science holding a meeting with an industrial group. I can assure you that it was worth while. The program went off remarkably well due to the caliber of the speakers. The whole academy is indebted to our assistant secretary-treasurer, Dr. Negus, who so thoroughly prepared for the meeting. A science organization does not exist for itself alone and our academy has demonstrated its awareness of this larger prospective.

Indicative of this cooperative spirit between the Virginia Academy and industrialists is the fact that our president-elect, Dr. Stow, was invited to address the Virginia Section of the American Waterworks Association at its annual meeting in Roanoke, October 30-31, 1942. His subject was, naturally, the James River Project.

In this connection I think it should be recorded that for a number of years the Virginia Section of the American Chemical Society has held one of its May meetings in conjunction with our annual meeting and our program is given adequate space in its *Bulletin*. This year, too, we are happy to have the Virginia Blue Ridge Section of the American Chemical Society meeting with us. We have no doubt but that the cordial relations that have for so long existed between the Academy and these organizations will long continue. Perhaps it may not be amiss to suggest that we make an effort to have other science organizations within the state affiliate with the State Academy. We have such an affiliation with the Virginia Wildlife Federation.

Your president followed the usual custom in meeting with the Research Committee at the home of its chairman. I was

very much impressed with the seriousness and the sense with which the members of this committee attacked their problems and especially was I struck with the underlying philosophy governing the distribution of grants for research. One very significant suggestion issued from this meeting, namely, that a survey be made of the research now being done in our state institutions and by industry both within and outside the state, the idea being to discover what the research institutions of the state can do with their present or readily procured facilities by way of having Virginia Institutions do this research for industry instead of sending it outside the state.

In March, the Chairman of the Research Committee, Dr. Geldard, received his commission in the armed forces. This left a very important vacancy on this committee. I have asked Dr. Vilbrandt, senior member of the committee, to act as chairman for the remainder of the year. I felt that my successor should have a free hand in filling this vacancy.

At our last meeting it was agreed to hold this meeting in Norfolk. To your officers it soon became apparent that to meet in Norfolk would be to strain the hospitality of that city to the breaking point. By New Year even the most optimistic of Norfolk supporters were reluctantly forced to admit that it would be an impossible undertaking. To select another place of meeting as well as to consider other matters, a meeting of the council was called for January 16, 1942. The council decided to accept the ready invitation of Roanoke, with Hotel Roanoke as headquarters. I consider this a wise choice. The local committee on arrangements, with Mr. LeRoy Smith and Mr. J. D. Schumacher as co-chairmen, has worked untiringly and I feel certain that your every need will be attended to.

One of the pressing matters considered at the January council meeting was the proposed new section on bacteriology. Because such a section would trespass upon the province of at least two of our present sections, it was decided to have a committee, consisting of the officers of the two sections most concerned, to investigate and report at this meeting. However, these officers felt that the formation of a new section was too serious for them to decide and have deferred the matter until the time of this meeting. In the meantime, the Virginia Branch of the Society of American Bacteriologists has arranged a program for this meeting of the Academy. In this connection I commend to you the highly creditable program arranged by our "baby" section of Forestry.

The Committee on the James River Project suffered a distinct setback when its chairman, Dr. Stow, was called to serve as Assistant Administrator of the Mining Division of the War Productions Board. Even a man of Dr. Stow's capacity for absorbing odd jobs without a change of pace was forced to recognize that he was overworked. In recent weeks he has been al-

most lost sight of. Nonetheless the Committee on the James River Project was successful in getting the State Legislature to appropriate the sum of five thousand dollars for the publication of the Monograph on the James River. Much of the credit for obtaining this appropriation goes to the sub-committee on finances for the project, consisting of Major W. Catesby Jones, Chairman, Mr. William Clift, Mr. Jay Johns, Dr. E. W. Magruder, and Dr. W. T. Sanger. This committee likewise got together some money which can, and will, be used for incidental expenses in connection with the study, without having to draw upon the Academy Treasury.

The Academy is indebted to the Legislature on another score. A joint resolution was introduced in the Senate to create a Legislative Commission to study the advisability of establishing a State Museum of Science. The resolution was successful and the commission has already been set up. For your information, the membership of this commission consists of Senator Robert K. Brock, of Farmville, Delegate H. S. Johnson of Goochland, President W. T. Sanger, and myself, the last two being the Governor's appointees. The Virginia Academy of Science is particularly grateful to Senator Brock for sponsoring both resolutions.

The young Junior Academy of Science has been active, despite the loss early in the year of the Secretary of the Junior Academy Committee, Miss J. Frances Allen, whose place was filled by Miss Lena Artz.

For the first time in its history the Academy has been confronted with a world at war. The very existence of our nation is jeopardized, and the question uppermost in the minds of your officers in recent months has been: "How may the Virginia Academy of Science best serve the country?" We did not want the Academy to become involved in any sort of "busy work" for mere appearance sake. We have proceeded on the principle that while the present all-out effort for war is paramount, it is at the same time necessary to carry forward those activities in which we are already engaged, because concern for the future of science in Virginia is one way to make the nation strong.

After all, this is a war of science. In all history the military forces have never been so dependent upon science and technology. Not only is science a prime factor in fighting; it is decisive in the survival of the civilization in which we live and without which science itself cannot carry on. Therefore, science can serve by continuing to press forward vigorously with its normal affairs, but at an accelerated pace.

A number of our members have been called from their regular duties to devote their entire time to work directly concerned with the war effort. Our larger research institutions are participating in some of the three hundred projects that are being carried on in the laboratories of the country. This is in marked

contrast to the situation that prevailed in 1917 when many laboratories in colleges and universities were practically abandoned. The patriotism of American scientists is being demonstrated daily.

There still remains a large number of our members who impatiently wish to do more than merely "Carry on," and it might not be amiss for this conference to devote some thought to the rôle of the Academy in the present war. To one group of our members, namely, the physical scientists, I should like to call attention to the first number of the newly-created *A. A. A. S. Bulletin*. There we find it stated that 150,000 aviation cadets will be required in 1942, and 300,000 in 1943. Now this last number, 300,000, is about equal to the number of young men that normally enter the colleges and universities in any one year. "This pre-training for aviation courses provides something, indeed much, those in the physical sciences can do, and the need is urgent." A committee of the American Association for the Advancement of Science has prepared an outline of a course designed for such men, and the course has been approved by the Army Air Corps. I am of the opinion that every college and university in the state, and indeed some of the high schools, can take part in filling this need. Our present physics courses could be easily streamlined to meet these requirements, and could be covered in one semester, or in one summer.

As Austin H. Clark so well said in his address as retiring president of the Washington Academy of Science in February: "We who are engaged in science are no longer justified in appraising the world and our fellowmen in the light of their bearing upon our specialty, as in times of peace we are inclined to do. We must broaden our outlook and integrate our activities and our thoughts with that will-to-victory that animates us all."

There now remains for me to attempt to do something that my nineteen predecessors in office have attempted to do, and that is, to pay adequate tribute to the services of our esteemed secretary-treasurer, Dr. E. C. L. Miller. But words to accurately describe his value to this Academy do not come. Dr. Miller has so unfeignedly served us for the past twenty years that his name has become synonymous with the Virginia Academy of Science. He has been our only secretary for twenty years of the Academy's existence. He it is that makes the work of a president well-nigh a pleasure instead of a bore. It is the sincere hope of us all that he may continue to serve many other presidents as he has served the first twenty.

Report of the Secretary

In this war year, the question keeps recurring "What is the Virginia Academy of Science doing in this war effort?" Most of our members are functioning in one way or another, but what can the Academy as such do? No satisfactory answer has been

found to this question as yet. The Treasurer's Report shows that the Academy has on hand about \$1700, which has gradually accumulated and is not a part of the Research Fund. Several persons have suggested that part of this money might be put at the disposal of the Government by the purchase of bonds. Accordingly, a letter was sent to each member of the Council and to the members of the Finance Committee, which said:

"Please indicate whether you approve:

- (1) the placing of some of our funds at the disposal of the Government?
- (2) if so, how much should be thus invested?
- (3) if a bond should be purchased whether the Series F or G bond should be selected?
- (4) whether an academy of science might not use its money in some way more consonant with its whole policy and purposes and just as useful in the end?"

Among the replies, six favored investing some of the money (\$750-\$1000) in bonds, two were emphatically opposed saying that our funds should be held for use in the advancement of science, and four were uncertain. No bonds have been purchased as yet, and it might be well to decide the matter at this Academy Conference. I fear that it was not entirely clear in some of the voter's minds that this \$1700 is not a part of the Research Fund, but a small balance we have accumulated during the past twenty years.

A letter was then sent to each member of the Research Committee calling their attention to the matter and asking if they have any scientific project in mind that would be more valuable than buying a bond.

One thing we can and should do. We, as scientists, can register in the National Roster of Scientific and Specialized Personnel. I suppose most of us have already done so, but there are special blanks at the registration desk for any that have not registered as yet. If you have not registered, be sure and attend to it at this meeting.

All these years, we have been going along with very little change in the sections. Last year the foresters asked that they might be allowed to organize a section. They were told that they might try. They arranged a program, but the presentation of the program was somewhat disrupted by circumstances beyond their control. This year they are presenting a program.

The Virginia Section of the Society of American Bacteriologists has applied for affiliation with the Academy to function as a section and as an alternate to this, it has been suggested that there be formed a new section on Microbiology to include not only bacteriology, but also mycology, phytopathology, parasitology and related fields. It is hoped that the sections on Bi-

ology and on Medical Sciences will give this matter serious consideration at this meeting.

We started the year with 912 members, lost 165 and gained 135, so that now we have 882—a loss of 30. Apparently, one factor in this loss is the sharp drop in the number of collegiate members, from 81 to 41, or a drop of 40. This would fully account for the loss of 30 in total members. However, we may expect some loss of regular members due to war conditions, and it behooves each one of us to watch his local field and get every suitable person to join.

During the year, the Academy has been invited to appoint delegates to represent it at the celebration of three organizations. Professor A. B. Massey has been appointed for the celebration of the 75th anniversary of the Torrey Botanical Club of Columbia University, Dr. Marcellus H. Stow for the centennial celebration of Roanoke College, and Dr. E. C. L. Miller for the centennial celebration of Hollins College.

During the year, President Jeffers made the following committee appointments:

COMMITTEE APPOINTMENTS

New Committee

Committee on Academy Meetings: Grace J. Blank, E. B. Broadwater, Preston Edwards, Chairman, Guy Horsley, and Garnett Ryland.

This committee is to consider critically all the problems concerned with the meetings of the Academy, and especially the internal organization of the meetings.

ROTATING COMMITTEES

Nominating Committee: Wortley F. Rudd, so that the committee now stands in order of rotation: Earle B. Norris, Chairman, Ruskin S. Freer and Wortley F. Rudd.

Research Committee: Rolland J. Main, so that the committee now stands in order of rotation: Frank A. Geldard, Frank C. Vilbrandt, Gillie A. Larew, Ivey F. Lewis, and Rolland J. Main.

Place of Meeting: George A. Williams, so that the committee now stands in order of rotation: Chairman, Preston Edwards, Jos. K. Roberts and G. A. Williams.

COMMITTEES THAT CARRY OVER UNCHANGED

Committee on Collegiate Members: Paul R. Burch, A. H. Cooper, Helen Schultz, G. M. Shear, M. E. Taylor, and W. E. Trout, Jr., Chairman.

Conservation Committee: R. P. Carroll, Chairman, A. W. Drinkard, L. B. Henderson, W. D. Hoyt, W. M. McGill, J. E. Shillinger, A. M. Showalter, and T. W. Turner.

Fauna Committee: L. D. Anderson, J. W. Bailey, Paul R.

Burch, R. P. Carroll, Geo. W. Chappellear, Jr., H. R. Christie, G. Talbot French, Geo. W. Jeffers, E. Ruffin Jones, Jr., Chairman, W. A. Kepner, J. J. Murray, B. D. Reynolds, R. T. Taylor, W. L. Threlkeld, H. G. Walker and I. D. Wilson.

Finance Committee: D. W. Davis, Garnett Ryland and T. McN. Simpson, Jr., Chairman.

Flora Committee: Lena Artz, R. P. Carroll, R. S. Freer, I. F. Lewis, J. B. Lewis, G. C. Mason, A. B. Massey, Chairman, and R. F. Smart.

Museum Committee: Arthur Bevan, J. S. Bryan, Douglas S. Freeman, G. W. Jeffers, Chairman, G. C. Mason, Stuart McGuire, J. M. Miller, Jr., W. T. Sanger and Ida Sitler.

Publicity Committee: William Clift, Douglas S. Freeman, L. G. Hoxton, W. M. McGill, Sidney S. Negus, W. F. Rudd, Chairman, Ellen Shenk, I. A. Updike, C. E. Wheeler, III, and I. D. Wilson.

Sponsoring Committee of the Junior Academy of Science: L. F. Addington, L. C. Bird, Francis S. Chase, Geo. W. Jeffers, Vice-Chairman, J. A. Rorer, Chairman and I. A. Updike.

Committee on Time of Meeting: Robert F. Smart, Chairman, Raymond L. Taylor, and William Clift.

Committee on Virginia Journal of Science: R. P. Carroll, Managing Editor, R. S. Freer, Editor-in-chief, Ivey F. Lewis, Chairman.

Two of these committees have had small changes in their membership so that they now stand as:

Committee on Junior Academy and Science Clubs: Miss Lena Artz, Secretary, J. T. Christopher, Hubert J. Davis, Chairman, C. G. Gibbs, Miss E. Gillespie, Wm. T. Hall, H. S. Holmes, Miss Martha Lipscomb, W. I. Nickels, Jr., and W. W. Nofsinger, Vice-Chairman.

Long Range Planning Committee: Arthur Bevan, L. C. Bird, Chairman, Raymond B. Bottom, Julian A. Burruss, Francis S. Chase, Justus H. Cline, Virginius Dabney, Meta Glass, W. R. Harlan, J. Shelton Horsley, W. Catesby Jones, Ivey F. Lewis, H. K. McConnell, Robert F. Nelson, Wortley F. Rudd, Garnett Ryland, R. M. Sanford, and I. A. Updike.

E. C. L. MILLER, *Secretary.*

Report of the Treasurer

Balance on hand, April 15, 1941..... \$1,616.31

RECEIPTS

From Dues:

576 Regular Members.....	\$1,152.00
41 Collegiate Members.....	41.00
11 Sustaining Members	110.00

Total from Dues	\$1,303.00
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From Interest	19.55
From Junior Academy.....	54.73

Total Miscellaneous	74.28
Total Receipts	1,377.28
Total to account for.....	\$2,993.59

DISBURSEMENTS

Personal service:

Secretary	\$ 150.00
Clerical hire	65.00
Auditor	10.00
Printing	113.85
Supplies	2.91
Postage	110.74
Express	5.02
Corporation tax	5.00
Meeting expense	27.45
Virginia Manufacturer's Association	32.65
Section expense	7.79
Junior Academy expense	70.99
A. A. A. S. meeting expense	75.00
Virginia Journal of Science	500.00
Gift	15.78
James River Project	30.06
Badges	31.88
 Total Disbursements	 1,254.12
 Balance on hand April 15, 1942.....	 \$1,739.47
In Morris Plan Bank.....	\$ 884.19
In First and Merchants National Bank	855.28
 Total	 \$1,739.47
Balance April 15, 1942.....\$1,739.47	
Balance April 15, 1941..... 1,616.31	
 Gain	 \$ 123.16

E. C. L. MILLER, *Treasurer.*

Report of the Flora Committee

The activities of the committee continues slowly with the usual handicaps of academic burdens and slim finances for field work. Several cooperators are making very helpful contributions.

Dr. M. L. Fernald, assisted in the field by Mr. Bayard Long has continued the study of the vegetation of southeastern Virginia, which he started several years ago. To date he has published eight papers totaling 867 pages and 159 plates. These are full of taxonomic data of much interest and value. They contain much data which will be of value in the study of the vegetation of the lower James River basin. Each paper is excellently illustrated by photographs of a technical nature. The Chairman has been honored from time to time with invitations from Dr. Fernald to join him in the field.

Mr. H. A. Allard has completed his field work in the study of the Vegetation of the Bull Run Mountains. A large collection of plants has been made. With the assistance of Mr. E. C. Leonard of the National Herbarium these have been carefully studied and a manuscript has been prepared. This is ready for publication and is in the hands of the Chairman who hopes to find some means of assisting in its publication. Some of the botanists in Washington who have reviewed the manuscript consider it to be the most complete local flora which has been prepared in Virginia. The manuscript is more than a mere list of species found. Mr. Allard discusses the characteristics of the Vegetation of the area.

Dr. F. E. Egler, N. Y. State College of Forestry has been making a study of the plant life of the Seashore State Park in the Cape Henry region. He has issued a mimeographed bulletin which discusses the characteristics of the vegetation of the area and presents a catalog of the species of plants found. It is a valuable contribution to our State flora and it also will give assistance to the study of the vegetation of the lower James River Basin.

Dr. E. T. Wherry has prepared an instructive paper for the Committee on the ecology of the ferns of the James River basin.

The Washington-Baltimore Conference, Dr. E. H. Walker, Chairman, has continued the work on the flora of their designated area. The counties of Virginia northeast of the Rappahannock River and northwestward to the Bull Run Mountains are included in the area. A check list of the entire area has been prepared by Dr. F. J. Herman with the assistance of other botanists. This has been issued to the members of the conference in mimeographed form.

Messrs. F. R. Fosberg and E. H. Walker have made extensive collections in the Shenandoah National Park. A catalog of their collections was published in *Castanea* 6:89-136. 1941.

Mr. J. H. Roller of Bristol, Virginia, is actively engaged in a study of the plant life of White Top Mountain. He has assembled a very creditable collection of the species of the area. His work will make a valuable contribution to our knowledge of the flora of southwest Virginia.

Mr. J. B. Lewis has been actively working on the flora of Brunswick county with special reference to the Seward Forest.

Miss Lena Artz has been active in her study of the plant life of the Massanutton. She has made some interesting discoveries in the area.

Dr. I. F. Lewis and associates have been actively engaged with the vegetation of Albemarle county and in the Mountain Lake region of Giles county. A good collection of southwest Virginia species is being developed in the Mountain Lake Biological Station.

The Chairman has been active in the field in many parts of the State studying the characteristics of the vegetation and the distribution of species. The species of native grapes and their distribution in Virginia have been given special attention. His published work has dealt largely with economic features of the vegetation.

For example:

Plant Poisoning (a general discussion in Merck's Report)
Poisonous Plants (a mimeographed bulletin for farmers and livestock men), Dr. R. D. Hatch, D. V. M., Junior author

Farm Weeds: Their Importance and Control

Medicinal Plants (a mimeographed bulletin for crude drug collectors and others).

A Preliminary Check List of the plants of the State has been prepared. This includes nearly 3000 species and is incomplete. This has been prepared as a basis for developing an annotated catalog of the plants of the State.

The Committee has planned the development of botanical studies in the James River project.

A. B. MASSEY, *Chairman.*

Report of the Museum Committee

See page 152 of President's Report. For resolution see page 197.

Report of Conservation Committee

- I. At outset I recommend the conservation of time and space on program of Council meetings by the elimination of this Committee and its Personnel.
- II. If the above is not feasible then the Committee should consist of men who have the time, that is, not on any other committees, and such men should be men who will command the political respect of the powers that be, in Virginia.
- III. Our report is meagre as usual and along different lines this year. We have attempted to be more specific and to avoid this hypothetical generalities most of which are intangible, and, therefore, not feasible.
- IV. We have done these things:
 - a. We have attempted to do what we could to help further the James River Project (for instance, to call on legislators to get our appropriation, etc.).
 - b. We have co-operated with the Wild-Life Manager of the Jefferson National Park in laying out plans, including the specific details, for a Nature Trail, with the aim of educating the general public, but mostly school children, in the names of plants and animals and

their co-actions and the necessity for general conservation. This is situated in the North Creek Area back of Arcadia in Botetourt County near the Cave Mountain Park not far from Natural Bridge.

- c. We have co-operated with the above man in preparing a beautiful set of Kodachrome transparencies of flowers and food plants of the Jefferson which might well be used by the many schools in their classes.
- d. We have attempted to get contacts between the National forest, the State and the other agencies to know each other better and to co-operate.
- e. We have attempted to get the State Commission of Game and Inland Fisheries to lay out a program based along conservation and educational lines. For example, to have the game wardens have definite training and standards so that their duties are educational rather than punitive. Game wardens should be so trained that they can address the pupils in the local schools. (Digress—golden eagle called redtailed hawk—told to feed him corn, etc.) (1 of 9 over 70 years old.)
- f. We have attempted to do our part in fighting forest fires by helping to organize two leading colleges as a *third* line of defense in the fire fighting. Since the C. C. C. boys are no longer available some one must help. This co-operation is through the George Washington and the Jefferson National Forests, and the State set-up in Fire District Four through Mr. G. Henry Hodge, of Salem. This latter group is making a depository of tools in these schools that they may efficiently work. Also educational work is being arranged that these groups may fight fire intelligently.
- g. We have helped to certain county set-ups so that the boys of the senior classes will be trained to fight fire and when they go out of school to spread the gospel of Conservation. Also helped to contact the Emergency Corps of the Boy Scouts.

Respectfully submitted,

A. W. DRINKARD,
W. C. HALL,
L. B. HENDERSON,
W. D. HOYT,
W. M. MCGILL,
J. E. SHILLINGER,
A. M. SHOWALTER,
T. W. TURNER

ROBERT P. CARROLL, *Chairman.*

Report of Fauna Committee

There was no one present to report for this committee. A letter received during the meeting from E. Ruffin Jones, Jr., said: "I am very sorry not to have notified you that I would not be present at the Academy meeting in Roanoke. However, I expected to come until Thursday morning and it was then too late to get in touch with you or any member of the committee on fauna. I have no report for the committee on fauna. I would like to suggest a reorganization of the committee to the new president. I believe that the committee could function much more effectively if there were only three to five members of the committee proper and the large number of remaining specialists were classified as consultants to the committee. I should be glad to write you in more detail of this at a later date, and since the committee has been rather inactive under my guidance, I should be very glad to have some one who might inject new life into the committee as chairman."

Report of the Committee on The Virginia Journal of Science

Dr. Ivey F. Lewis as chairman of the committee made an oral report from the following report of Col. Carroll:

REPORT OF VOLUME 2, NUMBERS 1-8, 1941, OF THE VIRGINIA
JOURNAL OF SCIENCE

FINANCIAL REPORT

Costs

Income:

Subscriptions	\$ 338.00
Academy Appropriation	500.00
Advertising	75.00
Other Income (Gifts, Sale of Volume 1, No. 6, etc.)	76.08

Total.

Close of Volume: Total..... \$ 989.08
Deficit \$ 24.10

Deficit

SUMMARY

Deficit end of Volume 1, 1940.....\$242.30
Deficit end of Volume 2, 1941..... 24.10

Total deficit to date..... \$266.40

Amount owed to Jarman's.....	\$350.55
Available for payment.....	84.15
Less deficit made by Volume 1.....	\$242.30
Deficit Volume 2.....	\$ 24.10

Points to be considered:

The receipts for advertising (\$75), represents the amount collected to date and this advertising must be carried until the May 1942 issue in order to realize the benefits therefrom. Some of the amount paid for subscriptions obviously extends over into Volume 3, 1942, depending upon whether the subscription started with the date on which it was received or with the first number of the Volume.

Circulation of Volume 2 (excluding Program and Proceedings)	300
Paid Subscriptions	297
Free	3
Total	300

Analysis of Paid Subscriptions:

Members of the V. A. S.....	256
Institutions and Non-members	41
Total	297

Submitted by the Managing-Editor,
LT. COL. ROBERT P. CARROLL.

FINANCIAL REPORT

Total cost of printing and publishing Volume 1, 1940.....	\$1,220.05
Total cost of printing and publishing Volume 2, 1941.....	1,013.18
Total cost to date of printing and publishing Volume 3, 1942.....	379.50

Deficit at end of Volume 1, 1940.....	\$ 242.30
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Deficit at end of Volume 2, 1941.....	0.00
(On Report to the Committee on the Journal of 3/8/42 by the Managing-Editor, the sum of \$24.10 was reported as a deficit. Collection of old accounts and sale of back numbers took care of this deficit.)	

From Paragraph 1:

Total cost to date of Volume 3, 1942.....	\$ 379.50
Amount paid to date on Volume 3, 1942.....	88.10

Total amount outstanding due on Volume 3, 1942.....	\$ 291.40
Total deficit to date (from Volume 1, 1940).....	242.30

Total amount owed to date for all three Volumes.....	\$ 533.70
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Amount due Jarman's, Inc., Printers, Charlottesville	533.70
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Submitted by the Managing-Editor,

LT. COL. ROBERT P. CARROLL.

Report of the Committee on Collegiate Members

The Committee on Collegiate Members regrets to report that the number of Collegiate Memberships on April 24 was only 41, as compared with 81 last year. Although, as Dr. Miller points out, "this drop of 40 in the collegiate membership corresponds rather closely with the drop of 30 in total membership," it is nevertheless entirely too large a drop. Dr. Miller says further, "There may be several causes for this drop, but I am inclined to give considerable weight to the action taken at the Danville meeting in 1939, which practically relieves students of the obligation of paying dues. You will probably recall that it reads ". . . any student, on being introduced by a member of the Academy, may be allowed to present papers at the meetings of the Academy without payment of dues."

It is apparent that a number of problems have risen as a result of the emergency that are of considerable importance to this committee. The Committee welcomes all the suggestions that you will offer.

Respectfully submitted,

Committee on Collegiate Members,

PAUL R. BURCH,

ALBERT H. COOPER,

HELEN M. SCHULTZ,

G. M. SHEAR,

MILDRED E. TAYLOR,

WM. E. TROUT, JR., *Chairman.*

Because of the drop in the number of collegiate members, Dr. Trout asked permission of the President to take a straw vote of those present to determine how much sentiment there might be favoring reconsideration of the ruling adopted at the Danville meeting. In the call for a show of hands no count was made, but there seemed to be more that favored reopening the question than that opposed it.

Report of the Research Committee

Since the Richmond meeting last May, there have been two call meetings of the Committee. On November 1, the Committee met at the home of Chairman F. C. Geldard and Mrs. Geldard in Charlottesville, Virginia, for dinner and the study of research grant applications.

Present at this meeting were F. C. Geldard, 1942; F. C. Vilbrandt, 1943; Gillie Larew, 1944; I. F. Lewis, 1945; and R. J. Main, 1946; G. W. Jeffers, President of the Academy; E. C. L. Miller, Secretary; and S. G. Negus, Assistant Secretary.

Eleven applications totaling \$1,082.50 were submitted, but after individual case studies with some deductions, additions and

rejections, a total of eight grants for \$625.00 were made. Complete details of grants requested, deliberations and records appertaining to the decisions made will be found in the minutes of the meeting in Secretary Miller's files.

At the request of the Long Range Planning Committee of the Virginia Academy of Science, Chairman Geldard presented the proposal that the Research Program in the Long Range Planning Committee might temporarily be assumed by the Research Committee. At the November first meeting, Dr. Geldard suggested that the Research Committee might well make a survey of such resources in Virginia, including both equipment and trained personnel. Consequently, Dean E. B. Norris, Virginia Polytechnic Institute, was appointed to make such a study of research needs and research facilities in Virginia with special reference to cooperation between science and industry in the State. A report on progress was made by Dean Norris at the meeting of the Long Range Planning Committee, Hotel Roanoke, on May 7th, with suggestions made for assisting Dean Norris in the project.

Due to withdrawal of one of the recipients, one of the grants was returned, this to apply to the fund available next year.

At this point Austin Clark and L. S. Evans were presented to the audience by the President.

Report of the Committee on Academy Meetings

Dr. Preston Edwards read the report of the committee and it was referred to the Saturday Noon Business Meeting for action. (See pages 195, 196.)

Your committee after considering such suggestions as have been brought forward, for improving the interest and usefulness of the annual Academy meeting, wishes to present the following recommendations:

1. That the Thursday evening Academy Conference be given power to dispose of Academy business.
2. That the Saturday noon Business Meeting be discontinued. (Announcements, e. g., of Place of Next Meeting, Officers of Sections, etc., could be made at the Friday evening public meeting.)
3. That special effort be made to make the Friday evening meeting more inviting to the public, by arranging symposia on subjects of general interest, by repetition of a few important papers from sectional programs, by securing a high type of popular lecturer, or other methods.
4. That a Committee on Program be appointed each year, to arrange for the public meeting or meetings, and endeavor to make the whole program, including sectional as well as public meetings, as interesting and useful to the public as possible.

(One member thought the regular officers of the Academy should attend to this.)

5. That we suggest to the various Sections of the Academy that they give consideration to the same objects (in 3 and 4 above) in planning their sectional meetings.

Report of the Long Range Planning Committee

The organization meeting of the Long Range Planning Committee was held in Richmond on October 25, 1940. You will recall that Dean Rudd, who was then President of the Academy, had propounded the following questions to the members and certain other interested people:

1. What, in your judgment, should be the primary objectives of a State Academy of Science?
2. Please outline rather carefully, and in order of their importance, three or more distinct contributions that the Academy may and should make to Virginia in the next five years.

You will recall that the answers to these questions were classified under fourteen heads, as follows:

- Research
- Publicity of Academy's work
- Teaching and educational program
- Problems concerning the State
- Science Clubs and Junior Academy
- Guidance program
- Academy meetings
- Providing material aids
- Water pollution problem
- Problems of national defense
- Science museums
- Problems concerning industry
- Retaining Virginia trained scientists
- Miscellaneous

With these suggestions as a basis, committees having to do with the following specific problems were appointed:

1. Junior Academy of Science Club Work—Mr. H. J. Davis, Chairman. (You will recall that Mr. Davis made a report at our meeting last year.)
2. Research—Last year Dr. G. A. Geldard was Chairman of the Research Committee from the Academy. Dr. Geldard is also a member, as you know, of our Long Range Planning Committee, and with reference to Research, his position, which I assume reflects the position of the other members of the Research Committee, was reflected in a letter which he sent to the members of the Committee on February 11:

"At a meeting last week in Richmond of the Executive Committee of the Long Range Planning Committee the question of the possible appointment of a sub-committee to consider broadly what might be done to forward research in Virginia was broadened. In the discussion of this matter your chairman took the position that it was a proper function of the existing Research Committee to consider this problem. You may recall that it has been on the agenda for the last

two meetings to raise such general questions, but time limitations have prevented anything like a thoroughgoing discussion.

"The same practical considerations operate now, of course. The Committee is scattered and meetings are not readily arranged. However, I should like to get the reactions of the several members of the Committee as to the possibility or desirability of holding a meeting in the near future, one that would be devoted exclusively to the general problem of ways and means of encouraging more and better research in the State.

"The alternative to accepting this challenge on the part of the Long Range Planning Committee is that the latter will inevitably set up its own sub-committee, and it is apparent to the chairman that it must do so in the event that the regularly constituted Research Committee cannot undertake the task.

"I should be glad if you would seriously consider the practicality of this question and let me have an early response to it."

Of the 152 letters received by Dean Rudd in response to his questionnaire, 109, or 71 7/10%, mentioned Research as a primary objective of the Academy. These 109 replies may be classified as follows:

To promote research (35), through cooperation between schools, State agencies, and research workers (6). To stimulate research (3), among young people (2), in smaller colleges (2), through increased financial help (3), from the State (2), by providing recognition for research (1), providing direction (1), increasing the number of scholarships (1), raising the standards of research (1), and providing better fellowships (1).

As Dr. E. Emmet Reid recently said, "The South has been backward in research." He pointed out that a survey showed that only 4% of the pages in the *Journal of the American Chemical Society* come from the South, and of this one-half from the University of Virginia, one-fourth from two institutions in North Carolina, and the rest from other states. Dr. Reid observed that the Southern Agricultural Experiment Stations have probably done better, but that it was his opinion that the other sciences were in about the same condition as chemistry.

In assembling some data recently, I came upon the following rather astonishing facts:

According to a survey made by the National Research Council in 1939, there were 140 industrial research laboratories in the State of Massachusetts. This did not include college, university, and foundation laboratories. At that time, there were 18 such laboratories in Virginia. I use the State of Massachusetts as a comparison because there has been established in New England a New Products Committee, headed by Dr. Carl T. Compton, the idea being to develop plants and payrolls from discoveries in New England's famous research laboratories. The *News Edition of Industrial and Engineering Chemistry* for May, 1941, published a list of scholarships and grants sponsored by industry. The list contained 210 sponsoring agents supporting more than 721 scholarships, fellowships, and grants. Five Southern industries with headquarters South of the Potomac

were included as donors, and nine educational institutions in the same area were recipients. I am inclined to think that we have a challenge there.

The war has resulted in the United States not being able to import a number of items which were formerly brought in from abroad. In addition, the demand for other materials has been greatly accelerated. World War I resulted, as many of you know, in this country becoming independent of certain parts of the rest of the world, so far as a great many supplies were concerned. The United States will undoubtedly achieve independence in many commodities during World War II.

The following quotation is taken from a house organ of an essential oil producer:

"The possibility of developing domestic American essential oil industry, based on oils obtained from plants grown in this country, has for many years held the interest of perfumers and agricultural experimenters. The course of developments of the war has brought this question once again to the forefront and made it one of immediate concern to the aromatic chemical industry."

I was told recently by Mr. Morrell, managing editor of *Manufacturers Record* that more than \$1,000,000,000.00 worth of oil had been imported to this country prior to the war.

I have seen references to the possibility of certain drug plants being grown in the South. Dr. Haag says:

"There is no reason whatsoever, except an inherent inertia, why many of these plants cannot be grown below the Potomac."

I mention these two or three specific cases or possibilities only by way of illustration. There are, of course, numerous other possibilities.

Does the Virginia Academy of Science want to do anything beyond what we are doing now about this important subject of research? Can we afford it, or in the words of Mr. Morrell, managing editor of the *Manufacturers Record*, "Can we afford not to do it?"

At this point, I should like to give you five quotations from a paper delivered by Dr. George H. Boyd, head of the department of zoology at the University of Georgia, and President of the Southern Association of Science and Industry:

"My first suggestion, therefore, is that a real opportunity exists for any organization which will undertake to go quietly but actively about the job of promoting constructive scientific research in the problems of the South."

"If research is to progress it must have the sympathy and support which can come only when the public understands something of its aims, its problems and its possibilities. I am still further convinced that if applied research and industrialization are to make their rightful contribution to the progress of the South they must be built upon a strong educational system. The universities which train men for research constitute the foundation upon which applied research must rest."

"In order that the South may reap the greatest benefits from its natural resources it is necessary, not only that the industries be located in the South but also that the research problems relating to those resources be provided in the South. Furthermore, it stands to reason that the resources of the South can best be developed by those who know the South and who know those resources through close contact with them."

"If the scientist hopes to be a factor in building a greater South he must never cease to recognize his obligation to the public which supports his efforts—the public which must understand him."

"The task of implanting the aim, the spirit and the method of science in the minds and the activities of the public is one of the important tasks which science and industry must face. It is one of education and one which cannot be accomplished in a day."

This brings us to the third sub-committee which was appointed in response to the suggestions with reference to Academy work. This committee was called Education and Publicity. Dr. I. A. Updike served as the first Chairman of this committee, but had to resign because of the pressure of other duties.

The importance of the work of this committee is emphasized by the last quotation from Dr. Boyd.

I feel that the newspapers in Virginia are giving us, for the most part, excellent support. Dr. Negus, as you know, has a column in the *Commonwealth*, known as *Science Notes*. This publication has a circulation of around 6000 or 7000. As to whether or not the work of this committee should be pushed forward at this time, I do not know.

The fourth sub-committee was established as a result of 8 suggestions, or 5.2% of the replies. This is the committee on Science Museums, and our present President, Dr. George Jeffers, has been Chairman of this committee. They have done a very constructive piece of work.

A joint resolution introduced by Senator Brock at the last session of the Virginia Assembly was adopted, creating a commission to study the advisability of establishing a State Museum of Science. Senator Brock is a member of this committee, together with Representative Davis, Dr. Jeffers, and Dr. Sanger.

Because of the importance of finances in the operation of any organization, it was thought wise to appoint a committee which would study the financial policies of the Academy and make such suggestions as might seem proper with reference to the future financial operations of the Academy. Dr. H. B. Haag is Chairman of this committee, and a constructive report has been prepared.

What has commonly come to be known as the James River Project had its beginning with a letter written by Mr. Justus H. Cline to Dr. Ivey Lewis. As a matter of record, I am inserting this letter in this paper:

"A monograph on James River would perhaps appeal to the imagination of Virginians as much as anything the Academy could do.

"The James is strictly a Virginia River—drains important parts of all the physiographic provinces of the State and embraces practi-

cally every stream type. The majority of the important cities and institutions of learning in Virginia are located on it, or its tributaries. It varies from almost absolute purity to a very bad degree of pollution in its lower stretches. No stream in the country has more historical romance.

"What civilization has done to this wonderful river, which should be the pride of Virginia and the nation, would certainly be a fine thing for the Academy to find out and tell about, and I think the task of securing funds for the undertaking would be relatively simple, and the work would engage a number of the various sections of the Academy.

"I am curious to know what your reaction to the idea is.
"With best wishes."

Dr. Marcellus H. Stow is the Chairman of this very important committee. The committee has done excellent work, and they are in a position to speak for themselves.

Report of the Sub-Committee on Science Clubs and Junior Academy

A committee composed of Dean Rudd, Dr. E. C. L. Miller, Mr. L. C. Bird, Dr. Geo. W. Jeffers, Miss J. Francis Allen, and Mr. Hubert J. Davis met in Dean Rudd's office with Miss Margaret Patterson, representative of the American Institute of Science and Engineering Clubs of the City of New York, on May 2, 1941, to discuss some plan of cooperation between the American Institute and the Virginia Junior Academy.

A plan was agreed upon in which the American Institute would withdraw support of, and control over all science clubs in Virginia and these clubs would be administered by the officers of the Virginia Academy and Virginia Junior Academy of Science. The American Institute agreed to finance science club work in Virginia during the year 1941-42 up to \$100.00.

At this meeting it was agreed that Dr. E. C. L. Miller should serve as the treasurer of the Virginia Junior Academy of Science. Also, that the Virginia Junior Academy of Science should purchase its own stationery.

The first annual meeting of the Virginia Junior Academy of Science was held in the George Wythe High School Building, Richmond, May 3, 1941. A program was conducted during the morning, and the afternoon session devoted to business. At this meeting, a constitution was presented and adopted, a copy of which is attached. Student officers were elected, and prizes awarded for exhibits, and for a radio contest.

No financial help was ever received from the American Institute. In October, 1941, the managing trustee informed us that the American Institute had withdrawn all support of science clubs outside of the city of New York. Also, we were informed that this had been done in favor of Science Service, under the direction of Watson Davis. Science Service was led to believe that our affiliation would be carried over with their new

organization, *Science Clubs of America*. However, it was the opinion of many individual members of the Virginia Academy of Science that we should not undertake cooperation with the new organization.

The matter of our cooperation with *Science Clubs of America* was left unsettled until the Virginia Academy Council met on January 16th. At this meeting it was decided that we should not cooperate with them, but that the Virginia Academy of Science should provide support, financial and otherwise, to continue the work of the Junior Academy for the remainder of the year. At this meeting Miss Lena Artz was confirmed as secretary of the Junior Academy of Science to replace Miss J. Frances Allen who had moved to New York State.

The loss of the secretary, and the failure of our affiliation with the American Institute to materialize, and the consequent delay almost wrecked our organization, and handicapped our work for the whole year. At the council meeting on January 16th, it was suggested that the services of the members of the Virginia Academy of Science be enlisted as speakers for science clubs in their localities. This resulted in Dr. Thomas D. Rowe, Medical College of Virginia, appearing before the Thomas Jefferson Science Club in Richmond, on April 13th.

Since our work was begun in earnest in January the member science clubs have contacted several times and given a voice in determining the policies of the Junior Academy of Science.

The following monographs have been prepared and distributed to the Clubs: 1. "Science Activities Based on Chemical Warfare." 2. "Science Clubs and National Defense." 3. "Bibliography of Plays and Entertainment for Science Clubs." 4. "Chemical Warfare." 5. "Standards for Science Exhibits." An article has been prepared and is soon to appear in the *Virginia Journal of Education* on "High School Science and National Defense."

Under the joint leadership of Mr. Alfred Fisher, Jefferson Senior High School, Roanoke, and Mr. Seldon H. Watkins, Andrew Lewis High School, Salem, a program has been prepared for the second annual meeting which is to be held in Roanoke on Friday and Saturday of this week. The Junior Academy of Science is sponsoring the *Fisheries Exhibit*, the *Gottschalk Butterfly Exhibit* and the *Junior Academy Competitive Exhibit*.

There are now twenty-one science clubs affiliated with the Virginia Junior Academy of Science with a student membership of approximately 500. The income during the year from May 3, 1941 to April 16th, 1942, has been \$80.13 and the expenditures \$70.99. This report does not include the expenses of the current meeting.

The Science Club Committee recommends that the science club work of the Junior Academy of Science be actively supported for another year. That the chief objective for the year

be to help science clubs make a definite contribution to the national war effort. That efforts be made to accomplish this objective through active leadership of both the Junior Academy and Senior Academy officers. That the leaders of both organizations be on the alert to find pupils with outstanding ability and offer them encouragement and help. That when occasions arise where pupils need help, they be aided in securing scholarship in Virginia Schools, and other help which will enable them to continue their training in scientific vocations.

This committee recommends that the Sponsoring Committee and the Science Club Committee both be discontinued. That a new organization known as the Junior Academy Council be created to take their place. That this council be composed of seven members, three of which are members of the Senior Academy and four of which are sponsors of high school science clubs. That this council be appointed by the president of the Virginia Academy of Science upon recommendation of those interested in the work of the Junior Academy of Science, and that the president of the Virginia Academy of Science designate the president of this council. That the members serve three years, with at least two new members added each year. That they be so appointed as to permit new members next year. That the elected student officers of the Junior Academy of Science have an equal voice with the council members in conducting matters pertaining to the Junior Academy.

Respectfully submitted,

MISS LENA ARTZ,
MISS MARTHA LIPSCOMB,
MISS ELIZABETH GILLESPIE,
MR. W. I. NICKELS, JR.,
MR. J. T. CHRISTOPHER,
MR. C. G. GIBBS,
MR. WILLIAM T. HALL,
MR. H. S. HOLMES,
MR. W. W. NOFFSINGER,
MR. HUBERT J. DAVIS, *Chairman.*

THE VIRGINIA JUNIOR ACADEMY OF SCIENCE REPORT OF SECOND ANNUAL CONVENTION

ROANOKE, VIRGINIA—MAY 8 AND 9, 1942

The theme of the second annual convention of the Virginia Junior Academy of Science was "SCIENCE IN NATIONAL DEFENSE." This meeting consisted of science exhibits, two radio programs, two moving pictures, an address on "Chemical Warfare," and a business meeting.

RADIO INTERVIEW: The convention was opened by a radio interview at 11:30 A. M. Friday, over radio station WSL, under the direction of Miss J. Frances Allen, Pulaski High School. The interrogators on this program were Peggy Wilkinson, Jefferson Senior High School, Olga Zink, Andrew Lewis High School, Salem; John Lynos, Pulaski High School, and Don Coordes, Pulaski High School. Those replying were Dr. George W.

Jeffers, President of Virginia Academy of Science, Farmville; Dr. Ivey L. Lewis, Dean University of Virginia; Dr. John Alex Rorer, Extension Division, University of Virginia; Dr. Curtis L. Newcombe, William and Mary College, Director of Virginia Fisheries Laboratory; and Mr. Loyd C. Bird, President of Phipps and Bird, Richmond.

MOVING PICTURE: Two moving pictures were shown to a group of seventy-five delegates and sponsors in Jefferson High School Auditorium at 8:15. Mr. Seldon H. Watkins, Andrew Lewis High School, Salem, had charge. The color film "*Power Behind the Nation*" was provided by the N. & W. Railway. "*Fighting a Fire Bomb*" was shown, with Mr. Robert Cochran, Office of Civilian Defense, as narrator and lecturer.

RECEPTION: Delegates, sponsors and visitors gathered in the Jefferson library for an informal reception and refreshments after the motion picture. Miss Marion Carr of the Jefferson Science Club, and her reception committee were in charge.

REGISTRATION: During Saturday morning delegates from seventeen high school clubs registered. This included twelve sponsors and twenty-five visitors from the community and from the Virginia Academy of Science. More than two hundred delegates attended the meetings. The largest number registered from the host club. Pulaski High School had the second largest number, thirty-six pupils and three teachers.

GENERAL MEETING: William Garth, president of the Jefferson Science Club welcomed the visitors. A. J. Davis, president of the Virginia Junior Academy gave the response. Dr. Curtis L. Newcombe, Director of the Virginia Fisheries Laboratory, gave a description of the Marine Exhibit. He also outlined a tentative educational program which he wants to promote through the science clubs and high schools. This will include a display of the marine exhibit in the high school, many museum specimens of marine life, and pamphlets on conservation of oysters, etc., for both the teacher and the pupils.

SECTIONAL MEETINGS: These meetings were held in the laboratories and classrooms of the Jefferson High School. Dr. H. J. Johnson, of Roanoke College presided over the Chemistry section. Students from Jefferson, Pulaski, and Andrew Lewis High Schools presided over the other sections. Many worthwhile problems were discussed.

GENERAL MEETING: Miss J. Frances Allen presided at the general meeting. Dr. Geo. W. Jeffers, President of the Virginia Academy of Science gave a brief review of the business matters which had been discussed in regard to the promotion of the Junior Academy work. He informed the delegates that a special committee had been appointed to study the problem of affiliation with SCIENCE CLUBS OF AMERICA. That the Academy thought it wise to create a substantial budget for the support of the work of the Junior Academy of Science for another year. That the Senior Academy thought it wise to have the next meeting of the Junior Academy in the same building with the Senior Academy to create more intercourse between the two groups. That the next annual meeting would probably be held at Harrisonburg at Madison College.

Dr. Roy P. Ash, Professor of Biology, William and Mary College, introduced the main speaker, Major Herbert C. Roberts, of United States Chemical Warfare Division. Major Roberts delivered an interesting and forceful illustrated lecture on Chemical Warfare and the Civilian. This lecture was followed by a question and answer period.

RADIO QUIZ: The annual radio quiz was held in the studio of WSL at 12:30, under the direction of Miss Anita Cruiso, Andrew Lewis High School, with Roland Woodward, president of the Bi-Phy-Chem Science Club as announcer. Six science clubs were represented in the quiz. First prize of ten silver dollars was awarded to a representative of Roy C. Andrews Science Club, Pulaski. Second prize was awarded Tree Study Club of Arlington. Judges for the radio quiz were Dr. Paul R. Burch, Radford State Teachers College, Miss Mary Oglesby, Staunton, and Mrs. Sue B. Christian, Appomattox. The prizes were given by Phipps & Bird of Richmond and Caldwell Sites of Roanoke.

BUSINESS MEETING: Mr. A. J. Davis presided. Minutes of the last meeting were read and adopted. Resolutions were read, and other committees reported. Minutes of this meeting will be sent you later. New officers were elected. Mr. William Garth, Jefferson Senior High School was chosen unanimously as president for next year. Mr. Hope Christian of Appomattox High School was elected vice-president, and Mr. Byron Stokes of Warren County High School, Front Royal, was elected secretary.

EXHIBITS: "Nine years ago Carl Gottschalk started a collection of butterflies while but a freshman in high school. Although he has neither bought nor sold specimens his present collection comprises more than 4,000 different butterflies, and includes several hundred different species, many of which are rare and valuable. This collection includes rare species from Japan, Germany, Italy, Holland, Latvia, Turkey, Greece, Brazil, Peru, Canada, Switzerland and other countries." *News Bulletin Science Clubs of America.*

This absorbing collection of butterflies was exhibited at Hotel Roanoke under the sponsorship of the Virginia Junior Academy of Science. Other exhibits sponsored were the Virginia Fisheries Laboratory Marine Exhibit, and the Jefferson Senior High School Exhibit of model airplanes.

The following exhibits were displayed in competition for prizes: Remote Control Apparatus; Fun with Trees; Spatter Prints of Leaves; Peg Puzzle; Butterflies; Model of a Shaft Coal Mine; A Homemade Barometer; Cloud Formation; Chlorophyll Extraction; Velocity of Sound Apparatus; Mineral Display; Photomicrography Exhibit; Model of Norris Dam.

The Judges for the exhibits were Dr. Marcellus H. Stow, President of the Virginia Academy of Science, Dr. Curtis L. Newcombe, Director of Virginia Fisheries Laboratory, and Dr. Orland E. White, Blandy Experimental Farm, University of Virginia.

First prize was a pen and pencil set and was awarded to Andrew Lewis High School for "Photomicrography." Second prize, a Brownie Camera was awarded to Jefferson Senior High School for "Minerals." Third prize was awarded Arlington High School for "Fun with Trees," and was a dissecting set. Honorary membership in the Virginia Academy of Science was awarded to Pulaski High School for "A Model of Boulder Dam. The prizes for these exhibits were given by business organizations in Roanoke.

PICTURES: Thirty pictures were made covering the exhibit, banquet radio programs, and officers and delegates of the meeting. These pictures are available in sizes up to 8" x 10" for those who wish to purchase copies.

COUNCIL: The Virginia Academy of Science decided to enlarge the council of the Virginia Junior Academy of Science to ten members. Three of these are to be members of the Senior Academy, four high school science club sponsors, and the other three the elected officers of the Junior Academy of Science. This council will displace the Junior Academy Sponsoring Committee and the Science Club Committee, and become the executive body of the Junior Academy of Science.

CONSTITUTION OF VIRGINIA JUNIOR ACADEMY OF SCIENCE

AS ADOPTED MAY, 1942

ARTICLE I. NAME

This organization shall be known as the VIRGINIA JUNIOR ACADEMY OF SCIENCE.

ARTICLE II. PURPOSE

The object of the Junior Academy of Science shall be to stimulate interest in science, to work with the sponsors of the clubs and the Virginia Academy of Science in making high school science more worth while, and to work with other clubs in providing project materials and new ideas.

ARTICLE III. MEMBERSHIP

The membership shall consist of active chapters affiliated, which have met the requirements fixed by the membership committee.

Each chapter shall have an adult sponsor who meets the approval of the school administration.

Each chapter shall have a written Constitution which has met the approval of the membership committee.

All of the business meetings shall be conducted according to parliamentary procedure.

Each school may have one chapter membership in the Junior Academy which may consist of as many clubs as the school desires.

It is recommended that each chapter adopt the name of a patron scientist and be familiar with the life work of the scientist.

ARTICLE IV. FEES

Each chapter shall pay an annual fee of \$3.00 for any chapter in membership up to twenty and \$.20 additional for every member above twenty. This annual fee includes \$2.00 annual dues to the American Institute of Science and Engineering Clubs and \$1.00 annual dues to the Virginia Junior Academy. Ten cents of the additional fee will go to the American Institute of Science and Engineering Clubs and \$.10 to the Virginia Junior Academy of Science.

Chapters which for any reason cease to be members must surrender their charters at the request of the governing council.

ARTICLE V. OFFICERS

The student officers of the Junior Academy shall consist of president, vice-president, secretary, and any other officers needed, as decided by the delegates at their first annual meeting.

Each officer shall be elected by a majority vote of the delegates which are present at the meeting.

Each officer shall serve one year and shall not be eligible to succeed himself.

Every club shall have furnished a president to the Junior Academy before any club can furnish a second president. Other officers will follow the same procedure. No club shall furnish more than one officer in any one year.

The candidates for the office must conform to the eligibility requirements set up by the nominating committee. Any candidate which has met the requirements of this committee may be presented for election.

ARTICLE VI. GOVERNING COUNCIL

The governing council shall consist of the president, vice-president and the secretary of the Junior Academy of Science who shall be elected by the delegates of the chapters, and the president of the Junior Academy Committee along with two other members of this committee, which shall be appointed by the president of the committee.

The sponsor of the host club for the next Academy meeting shall serve on the governing council. The president of the Junior Academy Committee shall be designated by the president of the Virginia Academy of Science. All of the policies of the Junior Academy governing council shall be subject to the approval of the Virginia Academy sponsoring committee.

ARTICLE VII. MEETINGS

The regular meeting of the Junior Academy of Science shall be held at the same time and place of the Virginia Academy of Science. This, according to the latter's Constitution, shall be the second Thursday, Friday, and Saturday in May. Any additional meeting may be held at the discretion of the governing council. Such meetings as the local chapters may

hold must be fixed by the membership committee. The Junior Academy Committee recommends that the chapters sponsor science exhibits at the county fairs and at the district and State educational meetings.

ARTICLE VIII. EXPENSES AND BILLS

Bills incurred by the Junior Academy shall be payed by check from the treasurer and countersigned by the chairman of the Junior Academy Committee.

The Junior Academy shall arrange for an auditor to check the books before the treasurer gives his annual report.

ARTICLE IX. AMENDMENTS

Any proposed amendment must be submitted in writing to the governing council for its approval four weeks before the annual meeting. Amendments approved by the council become a part of the Constitution when approved by two-thirds majority of the voting delegates.

ARTICLE X. COMMITTEES

The president of the Junior Academy and the chairman of the Junior Academy Committee shall appoint at such times as are necessary the following committees. Membership, nominating, sectional meeting, exhibit, and any others deemed necessary.

ARTICLE XI. HONORARY MEMBERSHIP

Candidates for honorary membership in the A. A. A. S. and the Virginia Academy of Science may be submitted from the member chapters to the governing council for consideration. Evidence of the candidate's ability and his possibilities as a future scientist must be submitted with the candidacy. Three boys and three girls will be selected from this list, one boy and one girl who shall each be given one of the A. A. A. S. memberships and the others each be given the honorary Virginia Academy membership if such be established.

ARTICLE XII. DELEGATES

Each club shall be entitled to one delegate. This delegate and one sponsor from each club shall be entitled to one vote each.

Report of Sponsoring Committee for Junior Academy of Science

The sponsoring Committee for the Junior Academy of Science again has very little to report in the way of activities for the past year. We have held ourselves ready to serve the Junior Academy, and have kept in touch with that organization constantly through correspondence and conferences of the Chairman with Mr. Hubert J. Davis. Mr. Davis has very kindly consulted us in connection with his program for the year and his program and exhibits at the Annual Conference. We have heartily endorsed all his activities and wish again to commend him and the Junior Academy of Science Committee for their fine work in getting the Junior Academy functioning.

Last year our Committee was in touch with Dr. Shelton, of the American Institute of Science and Engineering Clubs, with a view to getting their assistance in the promotion of science clubs in Virginia. At the time of our last Annual Conference

there was hope that assistance would be forthcoming. However, since that time the funds of the American Institute have been drastically reduced and assistance can no longer be expected from that source at any time in the near future, if at all. It seems to this Committee, therefore, that for the present at least we must continue to operate the Junior Academy of Science on a self-sustaining basis with such assistance as the Virginia Academy of Science can give. When times are more normal perhaps we can hope for assistance from Virginia industries, but at present we do not feel that any drive for such support would be likely to receive favorable consideration.

At present, there are 21 science clubs affiliated with the Junior Academy of Science. With transfers of science teachers from one school to another and their call to the armed services of the country, it is possible that the number of clubs will be reduced next year and income thus lowered. However, we do not believe this would result in any great expense to the Virginia Academy of Science since the total budget this year, exclusive of the annual conference expenses, has been less than \$100.00 and has been met in full from income.

The Sponsoring Committee strongly recommends, therefore, that the Virginia Academy of Science continue as in the past its moral and financial support of the Junior Academy of Science.

Respectfully submitted,

Sponsoring Committee for the Junior Academy,

L. F. ADDINGTON,

L. C. BIRD,

FRANCIS S. CHASE,

I. A. UPDIKE,

GEORGE W. JEFFERS, *Vice-Chairman,*

J. A. RORER, *Chairman.*

Report of the Finance Committee

On March 28, 1941, President Wortley F. Rudd appointed the following committee to assist the Long Range Planning Committee of the Virginia Academy of Science in planning for the financial needs of the Academy: Mr. H. R. Hanmer, Doctor J. Shelton Horsley, Doctor E. W. Magruder, Honorable L. Preston Collins, and H. B. Haag.

So that the functions of this sub-committee might be more clearly understood and its tasks kept in proper perspective, we are quoting from that part of Dean Rudd's letter of appointment, bearing directly on its duties:

"The Virginia Academy of Science, in attempting to properly envisage its future maximum usefulness to our Commonwealth, has had its president appoint a Long Range Planning Committee—a title significant of its purpose.

"One of the more important phases associated with the activities of this committee is that concerned with the planning of the future financial policy of the Association after the evaluation of present ac-

tivities and future aspirations. To assist the Academy in this, a committee composed of men familiar with the problems of finance and science is being appointed.

"I should like to stress the point that this will be a policy-determining committee and not one charged with the actual raising of funds."

These findings which are now being submitted for consideration and possible use by the Long Range Planning Committee deal almost entirely with the financial policy of the organization in view of present activities. Until the future aspirations of the Academy take on a more concrete form it is difficult, if not impossible, to suggest adequate financial arrangements, especially in view of the uncertainties of the present. Actually, each new venture should be considered as a separate monetary problem.

In order to obtain information helpful in our assignment, questionnaires inquiring into the financial background of other State Academies of Science were sent out to about 25 Academies. Replies were received from 18.

THE JOURNAL

As judged from the questionnaires it appears that 10 of the 18 Academies issue their own journals; all support their journals partly from dues; with several, assistance is derived from the sale of advertising space and reprints; one receives state aid, and one receives aid from the State University. As one reads the comments concerning the financing of their journals, most Academies seem to have some difficulty. One secretary reported that occasionally he has asked friends for \$100 donations for journal purposes. In three instances authors are asked to pay \$1.50 a page. In several cases Academies publishing no journal do publish annual proceedings, which are assisted financially either by state grants or grants from state supported colleges.

The constitution of the Virginia Academy of Science states that one of the purposes of the organization is "To provide means for prompt publication of papers or abstracts." This can be interpreted that one of the major aims of our organization is to support our Journal. If this is so, then the sum of \$500 which the Academy has been allotting annually to its Science Journal appears proper and modest when compared with situations elsewhere. Actually because the Journal now bears the expense of publishing the Programs and Proceedings, this is more of a bookkeeping transfer than an actual increased expenditure. Should the Journal be continued, then as time goes on this assistance might be lessened, as the Journal seeks and obtains other support. The State might be asked to at least partially defray the expenses of this publication.

MEMBERSHIP FEES

Of 15 Academies answering the question pertaining to membership fees, 13 have fees for regular members ranging from one to two dollars; one has a fee of \$2.50, and one \$5. One has a student fee of 50c, six have a one dollar fee for associate and junior members, four have a fee of \$10 for sustaining members, three have a fee of from \$30 to \$50 for life members, and two list as patrons those who donate from \$100 up. In the Virginia Academy of Science regular membership dues are \$2, collegiate membership \$1, sustaining membership \$10, life membership \$50, and patrons \$1000 up or its equivalent.

It would appear unwise to increase any of the membership fees at present. They seem to be in keeping with the average trend, and unless unusual circumstances arise there seems to be little justification for any increase.

Two of the Academies have a membership of from 100 to 200; seven have a membership of 200 to 400; four from 400 to 600; five, 600 to 900. The Virginia Academy has about 900 members. This is a very good showing as compared with other state Academies.

SURPLUSES

Two Academies reported a deficit; seven reported that the disbursal of their surplus has been no problem with them. Of those having a surplus, the figures, per capita membership, varied from fifteen cents to \$8, or an average of \$2.30. The Virginia Academy has a surplus of approximately \$1600, corresponding to about \$1.70 per capita.

Fifteen of the Academies use their surpluses to defray the costs of their Journal or Proceedings; three indicated that surpluses are disbursed for research grants; four Academies are building up an endowment presumably from which to use interest for research purposes. One Academy gives appreciable assistance to the Junior Academy of Science, giving from \$1500 to \$2500 a year for this purpose.

REGISTRATION FEE

None of the Academies charge a registration fee at the Annual Meetings, and this would seem the best policy for the Virginia Academy to follow.

JUNIOR ACADEMY OF SCIENCE

Five of the state Academies have no Junior Academy; three others have Junior Academies but they have become self-supporting. With the exception of the Academy noted above which gives from \$1500 to \$2500 yearly to their Junior branch, the average support was \$40 a year. The Virginia Academy last year allotted about \$25 to the Junior Academy of Science; it seems

wise to continue assistance if necessary, particularly during these beginning years.

ANNUAL MEETING

The Annual Meetings of the Academies seem to be run at practically no cost to the Academies themselves; some supply badges; some pay expenses of the guest speaker, the cost running from \$17.50 to \$50. The cost of the Annual Meeting of the Virginia Academy of Science varies from \$25 to \$50 a year, exclusive of programs.

ENDOWMENT

Over a period of ten years the research committee has granted approximately 50% as much money as was requested. It is to be hoped that the endowment of approximately \$12,000 which yields most of the \$500 annually available can be increased by adding to it from accumulated surpluses and by gifts from interested individuals. This is one of the most important activities of the Academy. The sum of about \$150 is yearly refunded to the Academy for research purposes by the A. A. A. S. from membership fees of Academy members belonging to the A. A. A. S.

SUMMARY

All in all it seems that the present financial situation in the Academy is relatively in excellent shape in view of current expenditures. Actually some increases in expenditures which might facilitate management of Academy affairs seem justified. One of these, for instance, which might be contemplated is the furnishing of some secretarial assistance to the President whenever needed.

The Academy's surplus of some \$1600 should, it would appear, be kept as a reserve, inasmuch as it does not represent much more than one year's running expenses for the Academy. These funds might be invested partially in easily negotiable federal bonds. What should be a desirable surplus for an organization such as ours is difficult to answer. It may be that once the surplus reaches the figure of \$2000, yearly excesses should be given over for disbursal to the research committee and for use for promoting special activities of the Academy.

It would seem perfectly proper however, both from the standpoint of making the Academy more generally useful and as a move to improve the Academy's finances, if it considered additional types of membership as follows:

Endowed Perpetual Membership:

Libraries	\$25.00 a year
Institutions	50.00 a year
Manufacturers	100.00 a year

Respectfully,

MR. H. R. HANMER,
DR. J. SHELTON HORSLEY,
DR. E. W. MAGRUDER,
HON. L. PRESTON COLLINS,
DR. H. B. HAAG, *Chairman.*

Report of the Committee on the James River Project

At the meeting of the Southern Association for the Advancement of Science held in Mobile, Alabama, in March, 1941, the writer was honored with an invitation from the Long Range Planning Committee, of the Virginia Academy of Science, represented by Messrs. L. C. Bird, Wortley Rudd, and Catesby Jones, to become chairman of the James River Project Committee. The full Committee, appointed by the Long Range Planning Committee, consisted of Col. Robert P. Carroll of V. M. I., Mr. Justus H. Cline of Stuarts Draft, Dean I. F. Lewis of the University of Virginia, Mr. F. F. Smith of the Virginia Alcoholic Beverage Control Laboratories, Dr. Marcellus H. Stow of Washington and Lee University, and Dr. I. D. Wilson of V. P. I.

After giving the matter considerable thought and after consultation with such outstanding authorities on Conservation as Justus Cline and Dr. Henry Ward, the chairman wrote a report outlining the objectives of the James River Project. This report was mimeographed and copies were distributed widely throughout the State and to people interested in that type of study in various other States; it was printed in the October, 1941, issue of the *Virginia Journal of Science*, a reprint of which is herewith attached.

As a means of obtaining concrete expression of the objectives of the work on the Project it was decided to publish a monograph on the James River; the title for this is to be *The James River—Past, Present, Future*. This idea has been received with enthusiasm by scientists interested in the general subject of conservation. Dr. Sidney Negus wrote an outline of the Project for *Science* and one for *The Commonwealth*, these have received exceptionally favorable comment from numerous sources.

The field to be covered by the Monograph was divided into subjects representing the various branches of the Academy, plus several others that were not thus represented. Invitations were sent out to authorities in these fields asking them if they would contribute a chapter to the Monograph. In most cases the invitations were enthusiastically received and were accepted. An

outline of the topics was sent to each author and a brief statement concerning the length desired and suggested method of treatment accompanied it. Attached herewith is a copy of the outline for the Monograph and a list of the authors for the chapters.

The next step was to investigate methods for obtaining funds for the publication of the Monograph. It was agreed that the subject was one of considerable consequence to the State of Virginia and therefore, the cost of publication should be borne by the State. The chairman made an appointment with Senator Carter Glass, Jr., for suggestions as to the best method of approach. He advised that Senator Aubrey Weaver could recommend the proper procedure. A committee consisting of Dean Rudd, Dr. Miller, Mr. Bird, Mr. Foley Smith, Mr. Cline, Mr. Catesby Jones, and myself met with Senator Weaver in the Capitol at Richmond and outlined our plans for the Monograph and asked if he would advise us on the procedure for presenting a request for \$5,000 to the coming session of the Legislature. Mr. Weaver was enthusiastic in his acceptance of the idea and agreed to handle all phases of the matter in the Senate. A few weeks later another committee consisting of Mr. Cline, Col. Carroll, Dr. J. J. Murray, and myself waited upon Mr. Frank Moore of the State House of Delegates. He, likewise, was enthusiastic in his reception of our plans and agreed to attend to the necessary details in the House.

Before the Legislature adjourned the sum of \$5,000 was appropriated for the publication of the Monograph on *The James River—Past, Present, Future*.

Authors of the various chapters were requested to submit the manuscript to the Chairman of the Committee by April 1, 1942. But when original plans had been laid, Pearl Harbor was a little-known harbor in the Pacific Ocean. When it flared into fame, the lives of all of us were changed and I am afraid the publication of the Monograph will be delayed. The Chairman of your James River Project Committee was called to Washington in the middle of January for duty in the War Production Board and has been working about sixty hours a week in an office—which doesn't leave much time for the work he would rather be doing on the James River Project. Many of our authors are members of university faculties in which the calm of academic routine has been seriously disrupted, courses have been changed, curricula altered, and plans for summer sessions have had to be developed. This is not conducive to the kind of thought necessary for writing on the James River Project. Some of our authors are business executives or state officials and their routine has been suddenly altered. Although I had received only one manuscript by the middle of April, no one has asked to be entirely released from his agreement—presumably most of the authors have merely been delayed due to the cir-

cumstances of the times. It is sincerely hoped that the coming summer will present greater opportunity for the completion of the manuscripts, and I am certain that the terrible state of National and World affairs will ultimately serve to emphasize the great need for such a study as the James River Project involves. The idea has been looked upon with great interest and approved by Universities outside of Virginia, by State Geologists, by the President and officers of National Scientific Associations (attached is a copy of a letter from Dr. Richard M. Field), and by Federal officials in numerous offices. When Dean Rudd thought out the Long Range Planning idea and the Committee inaugurated the James River Project, a significant step was made toward the establishment of a new approach to the study of Sciences and toward the improvement of the World as a Human Habitat. May I express my great appreciation of the wise council and limitless enthusiasm of Judd Cline; he has been unique in his interest in the James River Project; without him we would have been unable to do what little has been done on this Long Range Project.

Respectfully submitted,
MARCELLUS H. STOW,
Chairman James River Project Committee.

January 5, 1942.

Dear Professor Stow:

Thank you for your recent letter and your report of the Special Committee of the Virginia Academy of Science on the James River Project. This is a particularly interesting and important project in geoscience and "Human Habitat"; and should serve as an excellent example of the sincere, intelligent, and practical attempt of the people of Virginia to focus their historical, scientific, and geographic research within, and for the benefit of, their state. The region selected is well adapted to the fundamental purpose of the project, and will afford an excellent opportunity for stimulating the best cooperative interests and efforts of all your people and institutions who are truly interested in human progress.

The Virginia Academy of Science is rendering not only a local, but also a national and international example in originating this project, the development and conduct of which, I am sure, will be watched and studied with great profit by other state and federal governments, as well as by private, sociological, and scientific institutions.

I am particularly interested in your endeavors in relation to the fundamental problems in geology and geophysics, and have just been informed that the Geological Society of America has appointed a Committee to advise its Council as to how the "Society" may best serve our country. I enclose a copy of a letter recently addressed to the Secretary of the Geological Society of America. This letter describes the personnel and preliminary plans of the Committee on National Welfare and Related Functions of the American Geophysical Union. I can assure you that our Committee will be informed of your project and that it will hope to learn further of your progress, as a particularly significant example of coordinated and unselfish cooperative research in geoscience and human affairs.

Sincerely and cordially yours,
(Signed) RICHARD M. FIELD.

Dr. Field is Professor of Geology at Princeton University, Past-president of the American Geophysical Union, and Chairman of the Committee on National Welfare and Related Functions of the American Geophysical Union.

REPORT OF SUB-COMMITTEE ON THE JAMES RIVER PROJECT

Reprinted from *The Virginia Journal of Science*, Vol. 2, No. 6, October, 1941

During the summer of 1940, President Rudd distributed a questionnaire to many members of the Virginia Academy of Science and to others throughout the State. The two questions concerned primary objectives of the Virginia Academy of Science and specific contributions the Academy should make during the next five years. There were one hundred and fifty-two letters of response containing four hundred and fifty-seven suggestions. These were classified under the fourteen topics of Research, Publicity of Academy's Work, Teaching and Educational Program, Problems Concerning the State, Science Clubs and Junior Academy, Guidance Program, Academy Meetings, Providing Material Aids, Water Pollution Problem, Problems of National Defense, Science Museums, Problems Concerning Industry, Retaining Virginia-Trained Scientists, and Miscellaneous. Even casual study of these topics will reveal a wide variety of interests, all of importance and of scientific value. Since some of the topics and problems were suggested by as many as seventeen individuals and since the questionnaire was widely distributed and the number of replies received was adequate, it can be reasoned that these suggestions are representative of the general interests of the members of the Academy.

How can such a wide diversification of valuable ideas be unified into a single objective that not only will hold the interest of the entire membership of the Academy, but will appeal also to the imaginations of the people of Virginia? It was obvious from the nature of the topics suggested that only a project of wide range could elicit the active interest of a body such as the Virginia Academy of Science. It seemed to the Long Range Planning Committee that by setting up some natural and resourceful feature of the State, with which everyone is already familiar, and which has played a profound part in scientific, economic, romantic, and social life of the State, the worthy aims of the Academy could be accomplished. The Long Range Committee has appointed a Special Committee to initiate and develop such a project.

It was considered by the Long Range Committee that the James River Basin would not only meet all these requirements, but would supply a field of research for all sections of the Academy, with the common ideal of laying a sound scientific foundation for the ultimate improvement of one of the most historic and beautiful areas in the United States as a human habitat. It is believed by many that such a project, if properly executed, would attract nation-wide interest.

Careful inspection of a map of Virginia will show that the headwaters of Back Creek are in the extreme northwest corner of Highland County near the edge of the Appalachian Plateau,

that Johns Creek has its source near Mountain Lake in Giles County, and that Dunlap Creek heads in Alleghany County. These counties are at the westernmost boundary of the State. As these small streams join and form larger ones and hundreds of others add water, the mighty James that flows past Richmond and into Chesapeake Bay at Norfolk is formed. From the westernmost boundary to Chesapeake Bay, the James transects all of the physiographic provinces of the State—the Alleghany Ridges, the Great Valley, the Blue Ridge, the Piedmont, and the Coastal Plain. Of the one hundred counties in Virginia, forty-two of them are either wholly or in part within the James River drainage basin. All branches of science are represented within this area. There are problems of Biology, Chemistry, Conservation, Education, Engineering, Forestry, Geology, Physics, Public Health, Sociology—the list is infinite. The great majority of the universities, colleges, and research institutions are located in the forty-two counties of the James River Basin.

In this great river we have our unifying idea around which can be correlated scientific, sociological and historical research. The project is enormous; the results are of inestimable value. The methods of approach are essentially two-fold—first a survey and compilation of information on what is *known* about *existing* conditions within the area of investigation—What is the *present* land-use? What is the *present* status of conservation of mineral resources, of wild life, of forests? What is the *present* status of education, of public health, agriculture, industry? The second phase of the project would be toward *scientific* improvement of existing conditions. For the success of the work, it must be emphasized that the object is NOT A REFORM MOVEMENT! The Academy would NOT attempt to put trout in all the mountain streams of the State, but by *scientific* study would attempt to determine conditions under which trout would thrive in the streams. The Academy would NOT undertake a direct campaign denouncing stream pollution, rather, it would undertake a *scientific* study to determine exactly what constitutes pollution and a study of means whereby pollution can be avoided, to the mutual advantage of all. It is proposed that the work on the James River Project be kept on the highest plane of careful scientific research; it should not become involved with the vagaries of politics nor in crusades against "vested interests." It should study the James River Basin as a human habitat and should indicate, wherever possible practical means for improving this human habitat.

Most of the members of the Academy who have been consulted about the Project have expressed whole-hearted enthusiasm for it. A few have been skeptical about the possibility or probability of practical accomplishment; none has been opposed to the principles of its main objectives.

Details of administration will have to be worked out over a

period of some months, but tentatively it has been planned to have an executive committee to serve as a general co-ordinating group, in association with which will be the various established committees of the Academy and a committee from each of the sections of the Academy.

It probably will be desirable for each section to determine and state the fields of investigation and problems with which it will be most concerned. These can be co-ordinated through the section committees.

As a means of obtaining concrete expression of the results of the work on the Project it will be necessary to publish a monograph on the James River. Until such a compilation can be made, individual papers should be published in the VIRGINIA JOURNAL OF SCIENCE or in other journals as specific contributions to the general project.

With co-operation among the leaders of science and scientific thought in Virginia, a new approach to scientific values and practical application of scientific knowledge can be attained that will be of national significance.

R. P. CARROLL,
J. H. CLINE,
I. F. LEWIS,
J. F. SMITH,
M. H. STOW, *Chairman*,
I. D. WILSON.

AUTHORS OF CHAPTERS
FOR MONOGRAPH ON
THE JAMES RIVER — PAST, PRESENT, FUTURE

Editorial Preface

DR. MARCELLUS H. STOW, Professor of Geology, Washington and Lee University. Chairman of the James River Project Committee.

The James River Region as a Thoroughfare before Coming of White Man
SIR AUSTIN H. CLARK, Smithsonian Institution.

Development of Transportation in the James River Area

MR. L. S. EVANS, Assistant to Vice-President, Chesapeake and Ohio Railway.

MR. JOHN J. FORRER, Maintenance Engineer, Virginia Department of Highways.

Recreation in the James River Region

MR. ROBERT F. NELSON, Public Relations Counsel, Virginia State Chamber of Commerce.

Agriculture

DR. A. W. DRINKARD, JR., Director, Agriculture Experiment Station, Virginia Polytechnic Institute.

Astronomy, Mathematics, Physics

DEAN T. MCN. SIMPSON, Randolph-Macon College.

Botany

DEAN IVEY F. LEWIS, University of Virginia.

Entomology

DR. G. T. FRENCH, State Entomologist, Virginia Department of Agriculture and Immigration.

Fish and Marine Invertebrates

DR. DONALD DAVIS, Professor of Biology, College of William and Mary.
DR. C. L. NEWCOMBE, Professor of Biology, College of William and Mary.

MR. THEODORE FEARNOW, Wild Life Technician, U. S. Forest Service.

Reptiles and Amphibians

DR. PAUL BURCH, Professor of Biology, Radford State Teachers College.

COL. ROBERT P. CARROLL, Associate Professor of Biology, Virginia Military Institute.

Birds

DR. JAMES J. MURRAY, Lexington, Virginia.

Mammals

MR. TALBOTT E. CLARKE, Executive Director, Commission of Game and Inland Fisheries.

Inorganic Chemistry

DR. WILLIAM G. GUY, Professor of Chemistry, College of William and Mary.

DR. JAMES W. COLE, School of Chemistry, University of Virginia.

Organic Chemistry

DR. IRA A. UPDIKE, Professor of Chemistry, Randolph-Macon College.

Education and Psychology

DR. DABNEY S. LANCASTER, State Superintendent of Public Instruction.

DR. C. E. MYERS, Supervisor of Research, State Board of Education.

Engineering

COL. CARTER HANES, Associate Professor of Engineering, Virginia Military Institute.

Forestry

PROFESSOR CHAPIN JONES, Professor of Forestry, University of Virginia.

Geology

DR. JOSEPH K. ROBERTS, Professor of Geology, University of Virginia.

DR. MARCELLUS H. STOW, Professor of Geology, Washington and Lee University.

DR. E. C. H. LAMMERS, Assistant Professor of Geology, Washington and Lee University.

Medical Sciences

Not yet assigned.

Industry in the James River Area

MR. L. S. EVANS, Assistant to Vice-President, Chesapeake and Ohio Railway.

Conservation of Natural Resources

DR. HENRY B. WARD, Emeritus Professor of Zoology, University of Illinois.

THE JAMES RIVER—PAST, PRESENT, FUTURE PREFACE

Purpose of the James River study.

Purpose of the James River Monograph.

JAMES RIVER REGION AS THOROUGHFARE BEFORE COMING OF WHITE MAN

Animal routes and trails.

Indian routes and trails.

DEVELOPMENT OF JAMES RIVER AS MEDIUM OF TRANSPORTATION

Boats
River
Canal
Highways
Railways
Air terminals

RECREATION IN THE JAMES RIVER AREA

AGRICULTURE

History of development of agriculture in James River area.
Land use development.

Present status of land use.
Suggestions for improvement of land use.
Education concerning land use.

Chemurgy.

Soil Erosion.

History of study of soil erosion.
Methods to prevent soil erosion.
Problems involved.

Education concerning soil erosion.

Agriculture and its relation to James River as a Human Habitat.
Past, Present, Future.

Problems for future study by sections of the Academy and other agencies.
Relative value of the area as a field for scientific investigations.

Selected Bibliography.

As a guide for obtaining further information.
Journals publishing results of research on agriculture in Virginia.

ASTRONOMY, MATHEMATICS, AND PHYSICS

History of the development of these sciences in James River area.
Effect of the development of these sciences on the James River as a Human Habitat.

How can James River area be improved as a Human Habitat through application of these sciences.

Problems under investigation by this section of the Virginia Academy and other agencies.

Problems for future study by various sections of the Academy and other agencies.

Tides, Meteorology.
Relative value of the area as a field for scientific investigations.
Selected bibliography.

As a guide for obtaining further information.
Journals publishing results of research in these sciences in Virginia.

BIOLOGY

BOTANY

History of the development of the study of botany in the James River area.

Location and description of unusual features.
Botany and its relation to the James River as a Human Habitat.

Natural relations.
Effects of man's activities.
How can James River be improved as a Human Habitat through botany.

Problems under investigation by Botany Section of Virginia Academy of Science and other agencies.

Stream pollution.
Problems for future study by Botany Section of the Academy and other agencies.

Stream pollution.

Dismal Swamp.

Relative value of the area as a field for scientific investigations.

Selected bibliography.

As guide for obtaining further information.

Journals publishing results of research in Botany in Virginia.

ZOOLOGY

Entomology.

History of the development of entomology in the James River area.

Entomology and its relation to the James River as a Human Habitat.

Natural relations.

Effect of man's activities.

Pest control.

How can James River be improved as a Human Habitat through entomology.

Problems under investigation by entomologists of Virginia.

Problems for future study by entomologists of Virginia.

Benefits to be derived by such studies.

Control of crop-destroying pests.

Control of disease-carrying pests.

Relative value of the area as a field for scientific investigations.

Selected bibliography.

As a guide for obtaining further information.

Journals publishing results of research in entomology in Virginia.

Fish and Shell-fish (Marine and fresh-water).

History of the development of the study of fish and shell-fish.

Relation to James River as a Human Habitat.

Natural relations.

Effect of man's activities.

Fishing.

Sport.

Commercial.

Stream pollution.

How can James River be improved as a Human Habitat through study of fish, etc.

Stream pollution.

Stocking.

Problems under investigation by Zoology Section of Virginia Academy of Science and other agencies.

Stream pollution.

Problems for future study by Zoology Section of the Academy and other agencies.

Stream pollution.

Dismal Swamp.

Relative value of the James River area as a field for scientific investigations.

Selected bibliography.

As a guide for obtaining further information.

Journals publishing results of research in this field in Virginia.

Reptiles and Amphibians.

History of the development of the study of reptiles and amphibians in James River area.

Relation to James River as a Human Habitat.

Natural.

Effect of man's activities.

How can James River be improved as a Human Habitat through study of reptiles and amphibians.

Problems under investigation by Zoology Section of Virginia Academy of Science and other agencies.

Dismal Swamp.

Problems for future study by Zoology Section of Academy and other agencies.

Dismal Swamp.

Relative value of James River area as a field for scientific investigations.

Selected bibliography.

As a guide for obtaining further information.

Journals publishing results of research on reptiles and amphibians in Virginia.

Birds.

History of the development of the study of ornithology in the James River area.

Relation to James River as a Human Habitat.

Natural relations.

Effect of man's activities.

Hunting.

How can James River be improved as a Human Habitat through study of birds.

Problems under investigation by Zoology Section of Virginia Academy of Science and other agencies.

Problems for future study by Zoology Section of Academy and other agencies.

Dismal Swamp.

Relative value of James River area as field for scientific investigations.

Selected bibliography.

As a guide for obtaining further information.

Journals publishing results of research on birds in Virginia.

Mammals.

History of the development of the study of mammals in the James River area.

Relation to James River as Human Habitat.

Natural Relations.

Effect of man's activities.

Hunting.

How can James River be improved as a Human Habitat through study of mammals.

Problems under investigation by Zoology Section of the Virginia Academy of Science and other agencies.

Problems for future study by the Zoology Section of the Academy and other agencies.

Dismal Swamp.

Relative value of James River area as field for scientific investigations.

Selected bibliography.

As a guide for obtaining further information.

Journals publishing results of research on mammals in Virginia.

CHEMISTRY

INORGANIC

History of the development of inorganic chemistry in James River area.

Relation to James River area as a Human Habitat.

Effect of man's activities.

Stream pollution.

How can James River be improved as a Human Habitat through development of inorganic chemistry.

Problems under investigation by Chemistry Section of the Virginia Academy of Science and other agencies.

Problems for future study by Chemistry Section of the Academy and other agencies.

Relative value of James River area as field for scientific investigations.

Selected bibliography.

As a guide for obtaining further information.

Journals publishing results of research in inorganic chemistry in Virginia.

ORGANIC

History of the development of organic chemistry in James River area.

Relation to James River as a Human Habitat.

Effect of man's activities.

Stream pollution.

How can James River be improved as a Human Habitat through development of organic chemistry.

Problems under investigation by Chemistry Section of the Academy and other agencies.

Problems for future study by the Chemistry Section of the Academy and other agencies.

Relative value of the James River area as a field for scientific investigations.

Selected bibliography.

As a guide for obtaining further information.

Journals publishing results of research on organic chemistry in Virginia.

EDUCATION AND PSYCHOLOGY

History of the development of education and psychology in James River area.

Relation to James River area as a Human Habitat.

Present status of science education in the schools: Primary, secondary, junior colleges, colleges, and universities.

Pre-medical education.

How can James River area be improved as a Human Habitat through development of education.

Problems under investigation by Sections of Education and Psychology of Virginia Academy and other agencies.

Problems for future study by Education and Psychology Sections of the Academy and other agencies.

Relative value of the James River area as a field for scientific investigations.

Selected bibliography.

As a guide for obtaining further information.

Journals publishing results of research in education and psychology in Virginia.

ENGINEERING

History of the development of engineering in the James River area.

Importance of engineering to James River area as a Human Habitat.

How can James River be improved as a Human Habitat through development of engineering.

Problems under investigation by Engineering Section of Virginia Academy of Science and other agencies.

Problems for future study by Engineering Section of the Academy and other agencies.

Water supply.

Electric power.

Highways.

Railroads.

Aeronautics.

Sanitation.

Relative value of James River area as field for scientific investigations.

Selected bibliography.

As a guide for obtaining further information.

Journals publishing results of research in engineering in Virginia.

FORESTRY

- History of the development of forestry in the James River area.
- Relation of forestry to James River area as a Human Habitat.
 - Natural relations.
 - Effect of man's activities.
- How can James River be improved as a Human Habitat through development of Forestry.
- Problems under investigation by Forestry Section of the Virginia Academy of Science and other agencies.
- Problems for future study by Forestry Section of the Academy and other agencies.
- Relative value of James River area as field for scientific investigations.
- Selected bibliography.
 - As a guide for obtaining further information.
 - Journals publishing results of research in forestry in Virginia.

GEOLOGY

- History of the development of geology in the James River area.
- Relation of Geology to James River area as a Human Habitat.
 - Natural relations.
 - Effects of man's activities.
- How can James River be improved as a Human Habitat through development of Geology.
- Problems under investigation by the Geology Section of the Virginia Academy of Science and other agencies.
- Problems for future study by Geology Section of the Academy and other agencies.
- Relative value of James River area as field for scientific investigations.
- Selected bibliography.
 - As a guide for obtaining further information.
 - Journals publishing results of research in Geology in Virginia.

INDUSTRY IN JAMES RIVER AREA

- History of industrial development of James River area.
- Scientific research in industry.
 - Past, present, future.
- Relation of industry to James River area as a Human Habitat.
 - Effect of man's activities.
 - Types of industries.
 - Why industries are where they are.
 - Stream pollution.
 - Natural resources used in industry.
- How can James River be improved as a Human Habitat through development of industry.
- Problems relating to natural resources that are under investigation by industrial organizations.
 - Raw materials.
 - Stream pollution.
- Problems for future study by industrial organizations.
 - Sources of raw materials.
 - Stream pollution.
 - Sanitation.
 - Disposal of wastes.
- Relative value of James River area as field for scientific investigations.
- Selected bibliography.
 - As a guide for obtaining further information.
 - Journals publishing results of scientific research in industries in Virginia.

MEDICAL SCIENCES

- History of the development of medical sciences in James River area.
- Relation of medical sciences to James River area as a Human Habitat.
- Public health—sanitation, stream pollution.
- Health and health education.
- Mental defectives.
- How can James River be improved as a Human Habitat through development of medical sciences.
- Problems under investigation by Section of Medical Sciences of the Virginia Academy of Science and other agencies.
- Problems for future study by Medical Sciences Section of the Academy and other agencies.
- Public health.
- Sanitation.
- Stream pollution.
- Health and health education.
- Mental defectives.
- Relative value of James River area as field for scientific investigations.
- Selected bibliography.
- As a guide for obtaining further information.
- Journals publishing results of research in medical sciences in Virginia.

CONSERVATION OF NATURAL RESOURCES

- History of the development of conservation in the James River area.
- Relation of conservation to James River area as a Human Habitat.
- How can James River be improved as a Human Habitat through development of conservation.
- Conservation education.
- Wild life refuges.
- Problems under investigation by Virginia Academy of Science and other agencies directly related to conservation.
- Problems for future study by Virginia Academy of Science and other agencies.
- Conservation education.
- Dismal Swamp.
- Wild life refuges.
- Stream pollution.
- Hunting and fishing.
- Stocking forests and streams.
- Predatory animals.
- Relative value of James River area as field for scientific investigations.
- Selected bibliography.
- As a guide for obtaining further information.
- Journals publishing results of research in conservation in Virginia.

SENATE BILL No. 200

Monday, February 16, 1942

A BILL

To appropriate the sum of \$5,000 to the Virginia Academy of Science to provide for the publication of a volume relating to the James River area of the State.

Patron—Mr. Brock

Referred to Committee on Finance

Whereas, the Virginia Academy of Science is engaged
2 in a comprehensive study of that part of the State of Vir-

3 ginia which is drained by the James River and its tribu-
4 taries, such study covering not only a scientific survey of
5 the area but its early history, its development as a place
6 of human habitation, its resources, historic interest and its
7 conservation and development, and has prepared for pub-
8 lication sufficient material for a volume of approximately
9 eight hundred pages but is without funds for publishing
10 and distributing such volume; and

11 Whereas, it is deemed proper that at least part of the
12 cost of such publication should be borne by the State of
13 Virginia; now therefore;

14 Be it enacted by the General Assembly of Virginia, That
15 there is hereby appropriated to the Virginia Academy of
16 Science, a Virginia corporation not organized for profit and
17 without capital stock, out of the general fund in the State
18 treasury, the sum of five thousand dollars, to be used by
19 the said corporation in publishing and distributing a vol-
20 ume containing the results of its investigation and study
21 of the James River area. The amount hereby appropriated
22 shall be paid by the Treasurer of Virginia on warrants of
23 the Comptroller issued on a voucher or vouchers signed by
24 the President of the Virginia Academy of Science, or by
25 such other person or persons as may be designated by such
26 corporation for the purpose.

At this point President Jeffers was obliged to leave for a radio appointment. He appointed Dr. Stow to act for him and he announced the appointment of a Committee on Resolutions consisting of R. G. Robb, A. T. Gwathmey and P. M. Patterson. (See page 197-198.)

WAR ACTIVITIES OF THE ACADEMY

At this point Dr. Leslie A. Sandholzer made the following statement:

The Virginia Academy of Science is in a position to accomplish a number of things in the war effort but it can not wait to be asked to do so for two reasons. First, the scientists are more keenly cognizant of the problems in their respective scientific fields than are the persons concerned with the administration of government. Second, because of their methods of operation and their lack of scientific training, political administrators frequently fail to see or hesitate to acknowledge the necessity for scientific programs in the war effort. This is particularly true in local areas where specialized problems may arise. It is the duty of the Academy, therefore, to make the community aware of its scientific needs in the war effort and to promote a program of scientific endeavor in line with this. Failure to do so can only lead to a lessened efficiency of the national war program.

At the same time, great care must be exercised in putting such a program in operation. It is very easy to permit wishful thinking to enter the justification for a war research plan. It is essential to restrict the scientific effort to war needs. In a good many instances this can be accomplished by merely diverting the normal peace-time pursuits into the war

channels but it can not be done by merely altering the title of a research project, nor can it be done by employing war materials for academic pursuits. The nutritional value of T. N. T. to alligators is not a war research in spite of the use of high explosive.

Since the war will obviously tend to fashion the post-war program, it would be well to consider any scientific endeavor from this angle as well. Now is the time to carefully plan the role that science is to play when peace returns. This requires a consideration equally as conscientious as that given to the immediate war problems.

It would seem to be in the best interests of society as well as of science for us to plan a war and post-war program of scientific endeavor. Therefore, I suggest that as a step in this direction that the Virginia Academy of Science make a definite effort to organize and promote such a program immediately.

His suggestion was referred to the Saturday Noon Business Meeting for action.

Mr. H. B. Derr spoke concerning his work with school children in Fairfax County, and Dr. Leonard I. Katzin spoke on nutrition.

No more business appearing, the meeting adjourned at 11:00 P. M.

Minutes of the Saturday Noon Business Meeting

The Saturday Noon Meeting was called to order at 1:15 P. M., Saturday, May 9, by President Jeffers.

Affiliation of the Virginia Section of the Society of American Bacteriologists

Dr. Paul M. Patterson reported the action taken by the Biology Section concerning the affiliation of the Virginia Section of the Society of American Bacteriologists with the Academy.

Recommendations of the Section of Biology Relative to the Virginia Section of the Society of American Bacteriologists

The Biology Section at its business meeting Friday noon, May 8th, 1942, passed two motions relative to the affiliation of the Virginia Section of the Society of American Bacteriologists. These motions are in the nature of recommendations to the Virginia Academy of Sciences for action.

1. It was moved and unanimously passed that the Section of Biology recommend heartily, approval of the affiliation of the Virginia Section of the Society of American Bacteriologists with the Virginia Academy of Sciences.

2. The Section of Biology by virtually a unanimous vote, disapproved of the organization of a section of Microbiology, where the tentative Section on Bacteriology would be enlarged to include such fields, in addition to bacteriology, as mycology, phytopathology, protozoology, parasitology and related fields.

(Signed) PAUL M. PATTERSON,
Chairman, Section of Biology for 1941-42.

Moved, seconded and carried that this report be adopted. It was stated that the Medical Section had taken no action in this matter.

The President then called for the names of the recently elected officers of the sections.

OFFICERS OF SECTIONS

1942-1943

Astronomy, Mathematics and Physics

W. H. Keeble, Chairman.

Isabel Harris, Secretary.

T. McN. Simpson, Jr., Representative on Editorial Board Virginia Journal of Science.

Bacteriology

L. A. Sandholzer, Chairman.

Ralph Houlihan, Secretary.

F. S. Orcutt, Representative on Editorial Board, Virginia Journal of Science.

Biology

Curtis L. Newcombe, Chairman.

Ladley Husted, Vice-Chairman.

Paul R. Burch, Secretary.

Robert F. Smart, Representative on Editorial Board, Virginia Journal of Science.

Chemistry

L. J. Desha, Chairman.

H. I. Johnson, Secretary.

J. S. Pierce, Representative on Editorial Board, Virginia Journal of Science.

Education

H. M. Alexander, Chairman.

H. W. Sanders, Secretary.

Engineering

J. B. Jones, Chairman.

F. C. Vilbrandt, Secretary.

J. H. Rushton, Representative on Editorial Board, Virginia Journal of Science.

Forestry

J. H. Johnson, Chairman.

George Dean, Secretary.

Chapin Jones, Representative on Editorial Board, Virginia Journal of Science.

Geology

R. J. Holden, Chairman.

S. S. Obenshain, Vice-Chairman.

R. O. Bloomer, Secretary.

E. C. H. Lammers, Representative on Editorial Board, Virginia Journal of Science.

Medical Sciences

H. E. Jordan, Chairman.

H. B. Haag, Secretary.

C. C. Speidel, Representative on Editorial Board, Virginia Journal of Science.

Psychology

Evelyn Raskin, Chairman.

Cecil B. Finley, Secretary.

R. H. Henneman, Representative on Editorial Board, Virginia Journal of Science.

The report of the Committee on Academy Meetings, which had been referred to this meeting by the Academy Conference, was then taken up and the recommendations were considered and acted on separately as follows:

1. That the Thursday evening Academy Conference be given power to dispose of Academy business.
Moved, seconded and carried that this be adopted.
2. That the Saturday Noon Business Meeting be discontinued. After considerable discussion, it was moved, seconded and carried that this be referred back to the Committee for further consideration.
3. That special effort be made to make the Friday evening meeting more inviting to the public.
Moved, seconded and carried that this be adopted.
4. That a Committee on Program be appointed each year to arrange for the public meeting or meetings, and endeavor to make the whole program as interesting and useful to the public as possible.
On statement by the Secretary that there is already an official Committee on Program, it was moved, seconded and carried that the incoming President be requested to endeavor to make this committee function helpfully. The committee consists of the President, the Secretary, and two chairmen of local committees on arrangements, the one for the preceding year and the one for the current year.
5. That we suggest to the various sections of the Academy that they give consideration to the same objects in planning their sectional meetings.
No action was taken.

At this point Mr. Schumacher suggested that, at future meetings, more attention be given to the coordination of the Junior and Senior programs and exhibits.

Report of the Finance Committee

Dr. Simpson stated that he had nothing to add to the two reports already made, namely, the regular report of the Treasurer, and the special finance report of Dr. Haag.

Report of the Research Committee

During the year, Dr. Geldard was called into active service as Major in the United States Army, and Dr. F. C. Vilbrandt, as senior member, was appointed as temporary chairman to complete the term of office of Major Geldard, which term expires this date.

On May 8, the committee met at luncheon meeting, Hotel Roanoke, for consideration of papers for prize awards.

At this meeting, those present were F. C. Vilbrandt, 1942; I. F. Lewis, 1945; G. W. Jeffers, President; M. C. Stowe, President-elect; E. C. L. Miller, Secretary; and S. S. Negus, Assistant Secretary. Secretary Miller made a report on the papers submitted for prize competition which were judged by a com-

mittee at Tufts College under the chairmanship of Dr. Paul Warren, formerly Professor of Botany at William and Mary. Secretary Miller reported that one paper, quite meritorious, was submitted through a misunderstanding of the ten-year rule, that no recipient of a prize can submit a paper for competition until after the lapse of ten years.

Therefore, but one paper was considered eligible for prize award. The committee decided that but one prize should be awarded, in this instance to be the Jefferson Award of \$50, sponsored by Phipps and Bird, Incorporated, Richmond, the prize paper to be submitted for competition with North Carolina and South Carolina prize papers for the major Jefferson Award. The Virginia Academy of Science Award was not made this year.

The Jefferson Award was presented at the banquet on May 8, to Dr. R. N. Jefferson, Virginia Agricultural Experiment Station, Blacksburg, Virginia, for paper, "The Influence of Carbon Tetrachloride on the Toxic Efficiency of Certain Volatile Compounds," which paper was also presented before the Botany Division on Saturday, May 9.

Comment from the judges of the prize paper should be quoted: "best of lot—good English—good style—interesting, though technical—work well planned—proof in the proper places—ready for publication without revision."

FRANK C. VILBRANDT.

Report of the Committee on Resolutions

WHEREAS, the Twentieth Annual Meeting of the Virginia Academy of Science in the City of Roanoke has been a most successful and a most pleasant one; now therefore,

BE IT RESOLVED, that the Academy express its sincere appreciation to all those in the city of Roanoke whose courtesy, generosity, and hard work have made possible this memorable meeting, especially to Messrs. J. D. Schumacher and Leroy Smith, Co-chairmen of the Local Committee on Arrangements, the Management of the Hotel Roanoke, the Roanoke College, the Hollins College, the Norfolk and Western Railway, the American Viscose Corporation, the Associated Press, the *Roanoke Times*, and the *Roanoke World News*.

BE IT RESOLVED, (FURTHER), that the Academy express its appreciation to Messrs. Alfred Fisher and Maury Strauss, of the Jefferson Senior High School and Mr. Selden H. Watkins, and Miss Anita Cruise of Andrew Lewis High School for their part in the successful meeting of the Virginia Junior Academy of Science.

WHEREAS, the General Assembly of Virginia in February, 1942, appropriated the sum of five thousand dollars to provide for the publication of a volume relating to the James River area of the State; now therefore,

BE IT RESOLVED, that the Academy express its gratitude to the General Assembly, and especially to Senator Aubrey Weaver, and Delegate Frank Moore, for their encouragement and generosity in furthering this most worthwhile project.

WHEREAS, Senator Robert K. Brock as patron of Senate Joint Resolution No. 19 of the General Assembly of Virginia in February, 1942, secured the adoption of a resolution authorizing the appointment of a com-

mission to study the advisability of establishing a Museum of Science in the State of Virginia; now therefore,

BE IT RESOLVED, that the Academy express its appreciation to Senator Brock for his helpful co-operation and effective services in securing the adoption of this resolution.

Respectfully submitted,

PAUL M. PATTERSON,

ALLAN T. GWATHMEY,

ROBERT G. ROBB, *Chairman,*

Committee on Resolutions.

Resolution adopted by the Forestry Section of the Virginia Academy of Science, at the Annual Meeting, Roanoke, Virginia, May 8, 1942:

WHEREAS, the Forestry Section of the Virginia Academy of Science has considered many aspects of the critical forest fire situation in Virginia,

BE IT RESOLVED, that we heartily commend the Honorable Colgate W. Darden, Jr., Governor of Virginia, for the constructive interest he has shown in this problem, as indicated by his proclamation addressed to the people of the State and in other ways, and

BE IT RESOLVED, that we pledge our assistance to the Governor and our support of his leadership in efforts to prepare the State to more adequately deal with such emergencies in the future through improved laws granting the Governor necessary discretionary powers, strengthening the State's forest fire protective organization, and in other ways that the Governor's judgment may suggest.

Signed:

J. H. JOHNSON, *Chairman,*
Forest Section, Virginia Academy of Science.

At this point Dr. Sandholzer was called on for a statement (see page 193), after which it was moved, seconded and carried that the incoming president appoint a committee to study the present and post-war problems.

Dr. Sandholzer further suggested that

"In view of the large number of scientists now stationed in Virginia as part of our armed forces, I suggest that the facilities of the Academy be offered to these men and that we extend them the hospitality of our meetings by giving them an opportunity to participate in our program by presenting papers and taking part in the discussions. An effort should be made to obtain the names of all such people and local scientific organizations should do everything possible to contact them. Some of the outstanding scientists of the country are included in this group of visitors and our contacts with them should be mutually beneficial.

Report of the Committee on Place of Meeting

Dr. George A. Williams reported for the committee that they recommended Madison College for our 1943 meeting. This report was adopted.

PRESTON EDWARDS,

JOSEPH K. ROBERTS,

GEORGE A. WILLIAMS.

Report of the Nominating Committee

The committee presented the following slate which was adopted:

President-Elect—W. Catesby Jones.

Secretary-Treasurer—E. C. L. Miller.

Assistant Secretary—Sidney S. Negus.

Members of the Council:

John H. Yoe—to take the place of Marcellus H. Stow
on elected list—term expires 1944.

Arthur Bevan—for regular vacancy—expires 1947.

W. F. RUDD,
E. B. NORRIS,
RUSKIN S. FREER.

Dr. Stow was escorted to the chair by ex-presidents Simpson and Rudd, after which he made a short speech of acceptance.

Tabulation of the registration cards after the meeting gave the following:

Section	Members	Non-Members	Section Total	% Non-Members
Astronomy, Math, Physics	32	27	59	45.7
Bacteriology	7	23	30	76.6
Biology (Botany, Zoology)	66	68	134	50.8
Chemistry	48	55	103	53.4
Education	9	6	15	40.0
Engineering	9	37	46	80.4
Forestry	4	4	8	50.0
Geology	13	10	23	43.5
Medicine	19	9	28	32.
Psychology	16	30	46	65.2
Non-specified	9	21	30	70.0
<hr/> Gross Total	<hr/> 232	<hr/> 290	<hr/> 522	<hr/> 55.4
Deduct for duplication	16	23	39	57.0
<hr/> Net registered	<hr/> 216	<hr/> 267	<hr/> 483	<hr/> 55.3
% of registration		55		

MINUTES OF THE
 SECTION OF ASTRONOMY,
 MATHEMATICS AND PHYSICS

ISABEL BOGGS, *Chairman*

W. H. KEEBLE, *Secretary*

FRIDAY, MAY 8—9:45 A. M.

Parlor 224, Hotel Roanoke

1. Reverberation Period Measurement of Auditoriums.
F. B. Haynes; Virginia Polytechnic Institute.
2. X-Ray Analysis of the Time Softening Property of a Lead-Tin Alloy.
Miss Bertha Weaver; Virginia Polytechnic Institute.
3. Some Temperature Effects On the Residual Charge in Paraffin-Paper Condensers.
W. M. Hickam; Virginia Polytechnic Institute.
4. Thermodynamics of Irreversible Processes.
J. Emory Cook; Virginia Polytechnic Institute.
5. The Inscribed and Circumscribed Similar Conies of a Triangle.
B. Z. Linfield; University of Virginia.

If u , v , w are the complex, or Cartezian vector, coordinates of the vertices of a triangle, then for any numbers a , b , c , and a' , b' , c' , on letting

$$x = -\frac{a^2}{t}, \quad y = \frac{b^2}{t-1}, \quad z = \frac{c^2}{t} \quad (abc \neq 0);$$

as the time (parameter) t varies, the point

$$P = \frac{a'xu + b'yv + c'zw}{a'x + b'y + c'z} \quad (a'b'c' \neq 0)$$

describes a conic through the vertices; and when x , y , z are a^2 , b^2 , c^2 resp., we get the symmedian point. Letting

$$x = \frac{t^2}{s-a}, \quad y = \frac{(t-1)^2}{s-b}, \quad z = \frac{1}{s-c} \quad (s = \frac{a+b+c}{2});$$

the above point P describes then a conic tangent to the sides of the triangle, and intersecting the line $x+y+z=0$ in points on the 1st conic. In particular, if $a'=b'=c'$, the conics are then similar and similarly situated. If $s=0$, the conics are tangent then to the last line, and become parabolas when $a'=b'=c'$. If $a^2=|v-w| 2/a'$, ... the 1st conic becomes the circumcircle. Hence the 2nd conics become then the inscribed and escribed circles when $a'=b'=c'$.

6. A Discussion of an Elliptic Integral.

J. E. Williams; *Virginia Polytechnic Institute*.

This paper simply gives a list of some interesting elliptic integrals that have been discovered in connection with work done in the Department of Mathematics at the Virginia Polytechnic Institute.

7. A Study of the Variation of Muzzle Velocity with Barrel Length in Revolvers.

Robert D. Hatcher; *Virginia Polytechnic Institute*.

This paper gives briefly the physical and mathematical relationships governing the variation of the muzzle velocity of the bullet and the barrel length of the revolver for a 32-20 revolver tested with factory loaded ammunition using both black and smokeless powders.

8. Absolute Norlund and Abel Summability.

Leonard McFadden; *Virginia Polytechnic Institute*.

9. A Comparator for X-Ray Powder Diffraction Patterns.

W. Richardson; *Virginia Polytechnic Institute*.

A measuring device for increasing the accuracy of measurement of the lines on X-Ray powder diffraction patterns is described. The instrument will be available for inspection by those who are interested.

10. Recent Changes in Map Interpretation.

F. N. Hibbard; *Weather Bureau, Richmond, Virginia*.

FRIDAY, MAY 8—2:00 P. M.

11. Early American Astronomers.

S. A. Mitchell; *Leander McCormick Observatory*. (30 min.)

Published in *Science*, 95, 489-495, 1942.

12. Parallaxes on the Assembly Line.

Dirk Reuyl; *Leander McCormick Observatory*. (60 min.)

An illustrated description is given of the methods of observation, measurement and reduction, employed at the Leander McCormick Observatory.

Since the beginning of the work in 1914 more than 50,000 plates, generally of two exposures each, have been obtained on 5,543 nights, resulting in the determination of the distances of more than 1500 stars.

A discussion is made of 1250 stars of known spectral type.

Business Meeting.

The following officers were elected for the coming year:

W. H. KEEBLE, *Chairman*.

ISABEL HARRIS, *Secretary*.

SATURDAY, MAY 9—9:00 A. M.

13. A Demonstration of the Construction of Nomographs.

Clifton B. Cosby; *John Marshall High School*. (20 min.)

A nomograph or nomogram is the graphic solution of a formula for many values within a preselected range. Its utility, time saving advantages, simplicity, and wide spread use are discussed. The paper presents several common types. The method of construction can be based on the simple rules of exponents, as nomograms, like the slide rule, are drawn on logarithmic scales. Unlike the slide rule, the nomograph may be used in addition and subtraction, and can have built into it constants to save extra

manipulation. A demonstration by serial slides of the construction of the several types is given with concluding remarks on accuracy, short cuts, and other practical hints.

14. Simple and Inexpensive Apparatus for Preparation of Mirrors by Evaporation.

F. L. Robeson; *Virginia Polytechnic Institute*.

15. Some Social Implications of Scientific Progress.

R. E. Loving; *University of Richmond*. (25 min.)

16. War Gives New Meaning to Physics Courses for College Women.

Miss Ann Timberlake; *Mary Baldwin College*.

Recently syndicated newspaper articles have treated the role of women in business and industry during and after the war and one of these articles severely criticized the women's colleges for offering almost nothing which prepares their students to earn a living.

Although the British have used women extensively to fill men's places as machine operators, a large proportion of the men called to war service from industry have held technical positions. That properly trained American women are not being supplied in sufficient numbers to replace men in similar positions is shown by the fact that of the physicists listed in *American Men of Science* only 3.1% are women.

To meet this problem, however, it is unnecessary to turn women's colleges into trade schools. Thorough training in the fundamentals of physics and other sciences would not only meet our immediate need, but would also provide a large group of people prepared to use the methods of the scientist in attacking post-war problems. Enrollment in these courses in women's colleges may be increased by substituting required for elective courses in science, providing more extensive training in mathematics, and increasing the emphasis on laboratory equipment and teaching personnel.

17. College Mathematics in a Country at War.

James S. Miller; *Emory and Henry College*.

This paper discusses the effect of the war situation on the current educational ideas and sets forth pointedly some of the ways in which our educational program must be modified to meet the urgent demands created by the changed conditions of modern war. In many branches of service the soldier is no longer just a common soldier; he is an engineer and a scientific fighter. Every domain of scientific knowledge has been laid under tribute in the construction and operation of the implements of war. Planes, ships and guns are only worth their weight in scrap unless operated by highly trained pilots, navigators and gunners. A letter of Admiral Nimitz is quoted in which the writer points out the deficiency in elementary mathematics shown by many candidates taking selective service examinations. Of 4200 entering freshmen at 27 leading universities and colleges no less than 68 per cent failed to pass the arithmetical test. The paper closes with indictment of the *laissez faire* system of selective studies which, of late years, has found much expression in both school and college programs, and urges the compulsory study of those subjects which will enable our young men to make their utmost contribution to the winning of the war. Since mathematics is the very language of science the demands of scientific warfare have suddenly raised it from a position of relative disfavor to one of universal, commanding importance.

18. Information Please. Unrehearsed answers to the question
"How do you do it in your college?"

As a result of the general discussion following Dr. Miller's paper and on motion of Dr. R. E. Loving, a committee was appointed to present to the State Department of Education the views of the Section on Astronomy, Mathematics, and Physics as to the need for greater emphasis on the teaching of mathematics and fundamental science in our public schools.

The following members were appointed on the committee:

Dr. James S. Miller, of Emory and Henry College, Chairman.

Dr. Preston H. Edwards, of Sweet Briar College.

Professor C. B. Cosby, of John Marshall High School.

This committee prepared the following resolution:

WHEREAS, a national emergency exists demanding the whole-hearted patriotic assistance and support of all citizens in measures necessary for the successful prosecution of the war, and

WHEREAS, there is greater need than ever for men and women trained to supply efficiently the varied requirements of the military and civil services, and

WHEREAS, the results of examinations of candidates for the above services show an alarming need for better knowledge of elementary mathematics and the sciences,

THEREFORE, be it resolved that a committee of three be appointed to present to the Advisory Committee on School and College Teaching the recommendations of the Section of Astronomy, Mathematics, and Physics that in view of the grave emergency confronting the nation a much greater emphasis be placed on the teaching of Mathematics in the schools of the state.

The above resolution was prepared by the committee and sent to Mr. J. Blair Buck of the State Department of Education.

MINUTES OF THE
SECTION OF BACTERIOLOGY

LESLIE A. SANDHOLZER, *Chairman*
RALPH B. HOULIHAN, *Secretary*

FRIDAY, MAY 8—9:30 A. M.

1. Streptococci Resistant to Sulfonamide Therapy.

George McL. Lawson; *University of Virginia*. (Lantern slides, 15 min.)

The favorable report on sulfonamide therapy of streptococcus infections in general must be modified in the future by a more careful identification of groups and types to which offending organisms belong. The classification into hemolytic, non-hemolytic and viridans groups is a time-honored but scientifically inaccurate division of the streptococci. Within each such group it is possible to pick out organisms which are pathogenic but are not affected by sulfonamide therapy. Among these are *Streptococcus fecalis* in the so-called viridans group and Lancefield's Group B streptococcus in the so-called hemolytic group.

Case reports are given concerning three patients infected with streptococci of Lancefield's Group B. Additional reports are presented showing the contrasting therapeutic results of sulfonamide therapy in sub-acute bacterial endocarditis due to *Streptococcus fecalis* and to *Streptococcus salivarius*.

2. A Simplified Method for Anaerobic Plate Cultures.

W. E. Bray and Jeanette S. Carter; *University of Virginia*.

Various anaerobic culture methods are reviewed, and the advantages and disadvantages of each are pointed out. A new anaerobic culture dish of Pyrex, made according to specifications of Dr. W. E. Bray, University of Virginia, was described and its use demonstrated. The special advantages of the dish are:

1. The bottom of the standard Petri dish is used for the media.
2. Storage of the media in Petri dishes conserves space.
3. Seal is made by applying a strip of Parafilm and slightly heating. This may be removed easily for examination of the culture.
4. Strict anaerobes, such as *C. tetani* and *C. welchii*, have been successfully cultured by this method.

3. Human Infection Caused by *Salmonella* San Diego.

W. E. Bray; *University of Virginia*.

Salmonella San Diego was isolated from two cases recently admitted to the University of Virginia Hospital. This is an uncommon type of *Salmonella*, the antigenic formula of which is IV, V: eh enz. This appears to be the first report of this infection in humans since the original description of the type by Kauffmann, who separated it from the *S. chester* group.

One case, which was fatal, was an infant who had subdural abscess from which the organism was isolated. The other case, a woman, ran a long septic course. The organism was isolated from the blood stream, and from the right kidney, which was removed on account of Pyleonephritis, but without improvement. Later a degenerated, apparently infected uterine fibroid was removed, after which recovery was prompt.

4. Cultural Studies of Staphylococci Isolated from Shellfish.
Herbert Birtha, Velma Brewington, Alethia Greene, William Quivers, and Lilly Riddick; *Hampton Institute.*
(Introduced by T. W. Turner.)
5. Quantitative Determinations of Myxoma Virus in Nasal Washings, Blood, Feces and Urine and Their Relations to Transmissibility.

Ralph B. Houlihan and George McL. Lawson; *University of Virginia.*

The purpose of this paper was to determine whether or not there was a correlation between the concentration of Myxoma virus in infective secretions and the transmissibility of the disease.

Blood, nasal washings, and feces were collected daily from infected rabbits. Urine was collected when the animal was moribund. These materials were titrated intradermally and the titer determined by the 50% end-point method.

Normal rabbits were brought into contact with infected animals: (a) direct contact for the duration of the infection; (b) direct contact for varying intervals at different stages of the infection; (c) direct nasal contact for one day on each day of the infection; (d) indirect droplet contact for one day on each day of the infection.

It was determined that the virus appears in the blood stream on the second day of infection and reaches its highest concentration when generalization is manifested. The virus appears in the nasal washings on the third day of infection and follows roughly the same concentration as in the blood. The virus is not present in urine or feces.

Contact experiments indicate that Infectious Myxomatosis is most infectious in the latter stages of the disease. This infectious period is reached shortly after the virus attains its highest concentration in blood and in nasal washings.

6. Kodachrome Photomicrography.

Kenneth B. Grim; *University of Virginia.*

There are many methods of obtaining good photomicrographs in color. The most commonly used are those in which the Leica or Contax cameras are attached to the eyepiece of the microscope with the micro-ibso miflex or similar photomicrographic attachments. Good natural color photographs may also be obtained by using an adapter ring and placing any 35 mm. camera directly over the eyepiece of the microscope. We have found that a 3200° Kelvin light placed about one foot from the sub-stage mirror gives the best results. Type A. Kodachrome film for artificial light does not have a very wide latitude and therefore the exposure must be exact, and the setup once in place must remain constant for each objective.

Since many photographers already have cameras which take 3 1/4 by 4 1/4 inch plates, the 35 mm. adapter for the kodak Recomar camera is a valuable adjunct, for it can be fitted directly to any of these cameras. With this adapter and with a bellows type camera, almost any desired magnification may be obtained. It is especially valuable for obtaining photographs without reduction in the size of the image. Since only the central portion of the field is photographed, a critical focus is easily obtained and there is no blurring of the periphery as sometimes occurs with other methods. This adapter is quite inexpensive and the photographs obtained with it are excellent reproductions in natural color.

FRIDAY, MAY 8—2:00 P. M.

Symposium: The Laboratory and the War Effort.

7. Negro Health Problems and National Defense.

T. W. Turner; *Hampton Institute*. (30 min.)

The Negro constitutes one-tenth of our total population. His physical welfare is, therefore, bound up in a multitude of ways with the welfare of the nation as a whole. His total health picture follows quite precisely the same pattern as that of the majority group in this country, whether observations are made in the south or the north, in cities or in rural areas. The same environmental conditions which predisposed the one group to dangers of infectious and other kinds of diseases affect the other group in the same general way.

On the whole the curves of mortality rates for all ages and for all localities bend in the same general direction for both races. (Lantern slides were shown illustrating these facts for a large number of diseases.) There seems to be no established authority for holding to a belief in a complete racial immunity to any disease. A further fact worthy of note here and amply verified is that whenever and wherever improved sanitary measures have been adopted and followed up by Negro communities the incidences to the various diseases have been lowered accordingly.

It is true that the incidences to certain diseases and the mortality rates are higher, sometimes very much higher among Negroes than among whites, but it is also true that very little progress has been made up to the present time in getting the public to recognize the fact that the chief contributory factors involved in this higher incidence and mortality rate are not racial but environmental and find their explanation chiefly in the inequalities under which the Negro group is obliged to live: poorer educational facilities, poorer wages, poorer housing, inadequate nutrition, inadequate hospitalization and clinical facilities and inadequate medical care.

Science today is doing an excellent job by setting forth in unbiased terms the nature of diseases, the methods by which they are transmitted and the responsibility of the public for their control; the public, however, has been slow to grasp fully the nature of the disease spread in a community and is still spending the major efforts and finances not in proportion to the prevalence or incidence of the disease, but along racial lines.

We cannot advance the nation in the time of peace nor defend it in the time of war with a tenth of the population exposed unnecessarily to the debilitating affects of preventable diseases.

The Negro is being sent along with other American soldiers to combat the best equipped armies which the German and Japanese militarists have been able to build up. His physical health is a paramount consideration in the National Defense.

8. War Aspects of the Pollution Problem.

L. A. Sandholzer; *U. S. Public Health Service, Norfolk*. (Lantern, 30 min.)

BUSINESS MEETING

The business meeting was held at 2 P. M. and the following business was transacted:

1. Dr. F. S. Orcutt was appointed to represent our section on the Editorial Board of the Virginia Academy of Science.

2. Arrangements were made to invite to our meetings any Bacteriologists from other sections of the country who might be stationed in Virginia during the war period.

3. A considerable discussion was held concerning the part Bacteriologists in our Society might play in relations of Public Health and Wartime Defense in Virginia. It was agreed that we should actively participate in such work and cooperate with the Virginia Academy of Science in this respect. A tentative committee was set up.

4. The possibility of training a reserve of women bacteriologists to counteract the drastic loss of male bacteriologists was discussed. The meeting adjourned at 3 o'clock P. M.

9. Stream Ecology and Available Food.

Leonard I. Katzin; *U. S. Public Health Service.*

A study of the principal streams of the Ohio River system has shown certain differences between streams and between portions of the same streams, in protozoan and algal plankton populations, and in fish populations. It can be shown, other conditions being equal, that these differences are closely related to the amounts of food available to the plankton, as a function of the amount of organic material introduced into the stream, either by natural means or through the direct agency of man. In general, on this basis, great differences between the streams of this basin are a reflection of differences in the amount of organic "fertilizer" available.

It has been possible to differentiate three main types of plankton: (a) a highly resistant, "thrifty" group, able to withstand low temperatures and extremes of low food levels; (b) a group with need of high level of food, usually or often organic, and a more limited range of temperature tolerance: in general, a group of forms which multiply rapidly under extremely favorable conditions, but of poor resistance; and (c) a wide group of forms intermediate between these. The first group tends to be of very wide occurrence throughout the Ohio basin, while the second is less commonly found, and then only during the warm summer months.

Five zones have been characterized, in terms of organic content, pH, dissolved oxygen, protozoan and algal plankton, and fish population, ranging from grossly polluted regions to those which are essentially sterile and barren. On this basis the distribution of forms found becomes understandable.

10. Dissociation of *Bacillus Albolactis*.

F. S. Orcutt; *Virginia Polytechnic Institute.*

Bacillus albolactis may dissociate into smooth and rough cultural forms, but morphologically and physiologically are identical. As with other cases of S and R forms the rough is the more stable. Neither form, however, is stable enough to give only pure smooth or rough colonies. On standard media, plating of the rough form yields about three per cent of the rough colonies, while the smooth form yields about seven per cent of the rough form. Some variations in environmental factors may change markedly the ratio of the S and R forms when plated. Both forms of this organism appear normally in dairy products of Virginia and could easily be mistaken for two distinct species of *Bacillus*.

11. Comparison of Total Bacterial Plate Counts of Soils Accurate Only After Deflocculation of Samples.

F. S. Orcutt and A. B. Stuart; *Virginia Polytechnic Institute.*

Dilution of soil samples for plating usually involves uniform shaking to attempt equal liberation of organisms from various samples of soil. Retention of bacteria in soil is dependent directly upon the state of flocculation of the soil. This in turn is dependent upon the amount of base

exchange material in the soil and the type of bases associated with it.

It follows that widely different soils and soils of the same type under variable treatment may be in various states of flocculation, so that plate counts made upon them are not comparable. Comparison can be made only when all samples are fully deflocculated to obtain uniform liberation of bacteria in the soil aggregates.

12. The Possibility of False Interpretations in Tests for Acid Production from Carbohydrates by *Bacilli* Due to Peptone Decomposition.

F. S. Orcutt and L. A. Nutting; *Virginia Polytechnic Institute*.

Peptone is commonly used as the source of nitrogen when a *Bacillus* is tested for possible ability to decompose carbohydrates. Acid production is taken as the usual evidence of carbohydrate dissimilation. A number of *Bacilli*, however, also produce acid from peptone to the extent of pH 6.0. A lower pH than this cannot be taken as a criterion of acid production from carbohydrates because acid may be produced from sugars without taking the pH lower than 6.0. Control tubes of peptone without the sugars are necessary to make the proper interpretation.

Ammonification from peptone concurrent with acid production tends to keep the pH near neutrality even though the carbohydrate is decomposed. This may be avoided by early observations, because alkali production is not extensive enough at first to neutralize acid produced from sugars. In many cases observed there appears to be no sparing action of carbohydrates on the peptone decomposition.

13. Physiological Differentiation of Members of the *Bacillus Mesentericus* Group.

W. B. Coffee and F. S. Orcutt; *Virginia Polytechnic Institute*.

In the latest edition of Bergey's manual, the following organisms are listed as variants of *Bacillus mesentericus*; *Bacillus aterrimus*, *Bacillus globigii*, *Bacillus niger* and *Bacillus vulgatus*. The characteristics by which they are distinguished from *Bacillus mesentericus* are not considered sufficient to retain them as individual species although these characteristics include pigment production and several carbohydrate fermentations. In actual trial the differentiation given in Bergey's manual has not been found to be reliable. A number of additional physiological tests have been made to better differentiate the members of this group.

14. Comparison of Methods for the Detection of Coliform Bacteria in Milk.

L. A. Sandholzer, A. Walker and M. Strong; *U. S. Public Health Service, Norfolk.* (15 min.)

RALPH B. HOULIHAN, Ph.D.,
Secretary-Treasurer.

MINUTES OF THE
SECTION OF BIOLOGY

P. M. PATTERSON, *Chairman*

RAYMOND L. TAYLOR, *Vice-Chairman*

PAUL R. BURCH, *Secretary*

FRIDAY, MAY 8—9:30 A. M.

1. A Genetic Study of Certain Virginia Family Lines.

E. S. Craighill Handy; *Fairfax, Va.*

The traditional forms of chart employed in genetic records were shown and it was pointed out that these are not adaptable to the needs of this study. What we term a Comprehensive Chart has been worked out to enable a great number of factors affecting individuals in the sequence of descent in family lines to be entered over the names of the individuals involved. The principle utilized is one common in genealogical recording which represents ancestors of the Propositus in radiating zones of a semi-circle in the upper half of the chart. The descending generations on our chart are in orderly arrangement beneath the Propositus. In panels on right and left are headings indicating the factors defining character or type, both cultural and physical, each factor being represented by a symbol. These symbols, entered over the name of the Propositus, define his personality in terms of interests, aptitudes and achievements, early conditioning, ethnic type and constitutional type. In so far as becomes possible, character of ancestors and descendants are likewise to be defined on the chart by means of the symbols. Ultimately it is hoped that archives of such records of interrelated families in sections of the state where distinctive ethnic strains predominate will, by a cumulative process, contain source materials that may be utilized both for precise genetic determinations and generalizations with respect to the inheritance of type and culture in family lines under varying environmental influences, physical and cultural, as represented in Virginia. Cordial thanks were expressed for the material aid and interest on the part of the Academy of Science, in particular its Secretary and Research Committee.

2. Spermatogenesis in the Cestode *Hymenolepis anthocephalus*
Van Gundy, 1936.

Arthur W. Jones; *University of Virginia.*

In partial answer to the suggestion in the literature on the cytology of cestodes, especially the work of C. M. Child and of R. T. Young, in the first twenty years of the present century, that cestode nuclei reproduce commonly by amitosis, the author presents a description of nuclear behaviour in a cestode.

Mitotic configurations are unequivocal and common in the soma; and spermatogenesis is similar to that reported for many other animals. The chromosomes number 12, diploid. Six bivalents always form at Meiosis I, and always disjoin equally at anaphase of Meiosis I, and likewise at anaphase II. Spermatozoa develop from the spermatids resulting from the second division.

It is suggested that the application of modern cytological technique to other cestode material will disclose a similar conformity to the accepted cytological aspect of reproduction.

3. A New Auridistome (Trematode) from the Snapping Turtle.

Bruce D. Reynolds; *University of Virginia.*

Five specimens of a trematode were obtained from the small intestine of *Chelydra serpentina* collected in John's Creek, near Mountain Lake, Virginia. These averaged 2.88 mm. l. X .66 mm. w., less than one half the size of *Auridistomum chelydrae* Stafford. Except for size, the morphological features are very similar to *A. chalydrae*, and the organism would be classified as a variety of that species, or a new species of the genus *Auridistomum*, were it not for the presence of a large, dorsally-opening holdfast organ. This structure is very similar to the ventrally-opening hold-fast organ commonly found in the family Strigeidae, but in most other respects the trematode is quite unlike stregeid worms. A name and definite classification must await further study.

4. Temperature Drop and Plant Mortality.

Orland E. White; *The Blandy Experimental Farm, University of Virginia.*

Temperature has long been recognized as one of the important limiting factors in plant and animal distribution. In 1926 (Brooklyn Botanic Garden Record 15:1-10), I presented a theory involving mutation, cold-resistance, and geographical distribution, which should be of particular interest to paleontologists, ecologists, horticulturists, and students of evolution. Current genetic theories are based on the widely supported assumption that genes arise as non-adaptive, non-purposeful, chance phenomena, due in the broad sense to mutation. Mutation is potentially capable of modifying any character, as indicated by the experimental data on the most intensely investigated genetic material, such as the vinegar fly *Drosophila*, Indian corn, and garden peas. Some limitations are recognized, due to the inherent nature or makeup of the material, which may cause certain changes to be rare or even absent in a given life form. It is further assumed that mutations are phenotypically direct in expression.

In these assumptions, mutations for increased cold resistance should appear in many plant and animal species regardless of the climatic character of their geographical distribution. Floras and faunas of warm temperature and tropical regions should contain individuals, or groups of individuals (varieties), or even higher systematic groups (species) which could survive much lower temperatures than those of their natural habitats. Even such regions as the Amazon valley and such species as that of the banana might conceivably have forms that could survive zero winters, but intense exploration and experimentation would be necessary to discover them and even this might be futile. Obviously no one would suspect the existence of cold-resistant forms in a tropical flora, until they could be subjected to experimental proof, since many other factors may have confined them to the tropics.

Since plants are grouped into systematic units on the supposition that they are derived from a common ancestor and since ancestral characters persist through inheritance, unless lost through mutation, then plant families and other taxonomic units may be classified as cold resistant, mixed, and cold intolerant. Rosaceae, Salicaceae, and Caprifoliaceae are examples of the first type, Leguminosae and Liliaceae of the second, and Ebenaceae, Sapotaceae, and Annonaceae of the third. Floras and faunas may represent mixtures as to cold resistance, some species having reached the limit of their temperature tolerance, while others growing beside them could live so far as temperature is concerned, at very much lower temperatures.

This whole problem is discussed with examples based on 14 years of experimental work at the Blandy Experimental Farm growing species from regions with much higher temperatures.

5. Chromosome Numbers and Phylogenetic Relationships in Euphorbiaceae.

Bruce A. Perry; *The Blandy Experimental Farm, University of Virginia.*

Comparative studies of chromosome number determinations, chromosome morphology, geographical distribution, and the morphology of the plants involving more than a hundred species of the Euphorbiaceae were made in order to determine the correlation existing between these phenomena and the phylogeny of the family. The chromosome numbers determined are inferred to belong to a primary system of $n = 8$. In the evolution of the family an ascending and a descending chromosome series has functioned with the establishment of secondary basic numbers of 6, 7, 9, 10, and 11. The frequency of polyploidy in the family is about 43 per cent. The data on distribution, temperature, and polyploidy for the Euphorbiaceae support neither the concept that polyploids have a wider distribution than diploids, nor the concept that polyploids have a more northern distribution than diploids. Instead the distribution of a species depends on its genetic constitution and its phyletic relationship. Numerical data on chromosome numbers indicate that higher numbers are associated with the perennial condition. Thus it would seem that the data for the Euphorbiaceae support the view of Arber that herbaceous plants are primitive and woody plants derived.

6. A Preliminary Study of the Chromosomes of Several Virginia Snails.

Paul R. Burch and Ladley Husted; *Radford State Teachers College and University of Virginia.*

Nineteen species in seven genera and five families have been examined cytologically. In the family Polygyridae twenty-nine chromosomes haploid are found in three genera and fourteen species. Some individuals of *Triodopsis fraudulenta* have thirty chromosomes and some twenty-nine. *Mesodon appressa* seem to have twenty-nine chromosomes as well as thirty-one. In the families Endodontidae, Zonitidae and Haplotrematidae four species in three genera have thirty chromosomes. One individual of *Mesomphix oxyccoccus* has twenty-nine rather than thirty chromosomes. In the Succineidae, *Succinea ovalis*, has twenty-one haploid though this species outside of Virginia is known to have twenty with a lower chiasma frequency.

Some individuals of *Triodopsis tridentata*, *T.t. edentilabris*, *T.t. juxtidenta* have an heteromorphic bivalent seen in the primary spermatocytes. The individuals of *Triodopsis fraudulenta* examined with twenty-nine chromosomes all have an heteromorphic bivalent.

7. Manganese Toxicity Associated with Phosphorus Deficiency in Tobacco.

G. M. Shear; *Virginia Agricultural Experiment Station, Blacksburg.*

Two years ago a type of necrotic spotting which was identified by J. E. McMurtrey as due to manganese toxicity was observed at Chatham, Virginia, on tobacco growing on experimental plots receiving no phosphate. The relationship between phosphorous deficiency and the occurrence of manganese toxicity was investigated. Total manganese in tobacco leaves as well as available manganese and nitrate nitrogen in the fertilizer band were found to be highest during the middle of the growing season, in plots receiving no phosphate. The soil in these plots was also found to be more acid. Part of the acidity can be traced to the decomposition of the organic nitrogen carrier in the fertilizer. It appears that under the soil conditions existing in the plots described, the chief effect of phosphate in preventing manganese toxicity is an indirect one, as the poor growth result-

ing from its deficiency permits the accumulation of nitric acid in the soil which liberates toxic amounts of manganese. Under most cropping systems this unused nitrate would rapidly diffuse and leach out of the root zone, but in the case of tobacco where the rows are ridged, leaching is retarded.

8. The Garden Slug, *Limax maximus* L., as a Detector of Mustard Gas, Dichlor-Ethyl Sulfide.

Frances McCorkindale and Paul R. Burch; *Radford State Teachers College*.

During the last world war Dr. Paul Bartsch, Curator of Mollusks of the United States National Museum reported that the common garden slug, *Limax maximus* L. was more sensitive to Mustard Gas, Di-Chloro-Ethyl-Sulfide, than man, beast, or any animal tested. His experiments showed that when the slug was subjected to one part of mustard gas in twelve million parts of air it twitched its tentacles in a characteristic manner. When the concentration was increased to three parts in twelve million it retracted its tentacles entirely, secreted a creamy mucus all over its body, writhed and finally stopped crawling. The gas dissolves in the moist skin of the slug and sets free Hydrochloric acid which seems to be the immediate cause of the characteristic blister which follows contact with the gas.

Mustard gas is used as a war gas to kill, incapacitate or interfere with the activities of people, because of its toxicity and difficulty of detection. A person may be in an area where the concentration of the gas is 120 parts in twelve million for several hours without being able to detect its presence, and yet this concentration breathed for one hour is enough to permanently injure his lungs and make him susceptible to pneumonia. Dr. Bartsch also reported that the slug did not react to burned powder gases, nor to any of the other so-called camouflage gases which have been used with this gas.

The value of the slug seems obvious. Anyone, an air-raid warden for instance, might keep a supply of these slugs in his air-raid shelter where he could get them in case of an alert. He could transfer them to a small bait box which he might fasten on his belt. During an air-raid if bombs were exploding in his area, observation of the slugs from time to time would give him advance warning of the presence of mustard gas before it was present in harmful concentration and allow him to warn his charges to put on gas masks, or if without them to seek higher elevations.

The booklet on Gas Defense distributed by the ODC refers to no better detector than the human nose, nor does any other discussion of mustard gas contain any reference to the use of slugs, yet the slugs are 15 to 40 times as sensitive as man.

The purpose of this paper is to pass on to others this information.

9. The Salamanders of Virginia.

Charlotte M. Fisher and Paul R. Burch; *Radford State Teachers College*.

A check-list of the salamanders of Virginia with illustrations:

Cryptobranchidae	<i>Cryptobranchus alleganiensis</i> (Daudin)
Pleurodelidae	<i>Triturus viridescens</i> (Rafinesque)
Ambystomidae	<i>Ambystoma opacum</i> (Gravenhorst) <i>A. maculatum</i> (Shaw) <i>A. jeffersonianum</i> (Green)
Plethodontidae	<i>Desmognathus quadra-maculatus</i> (Holbrook) <i>D. fuscus</i> (Rafinesque) <i>D. phoca</i> (Matthes) <i>D. ochrophaeus</i> (Cope)

	<i>Plethodon yonahlossee</i> Dunn
	<i>P. metcalfi</i> Brimley
	<i>P. glutinosus</i> (Green)
	<i>P. cinereus</i> (Green)
	<i>P. wehrlei</i> Fowler and Dunn
	<i>Hemidactylum scutatum</i> (Schlegel)
	<i>Aneides aneus</i> (Cope and Packard)
	<i>Gyrinophilus porphyriticus</i> (Green)
	<i>Pseudotriton montanus</i> (Baird)
	<i>P. ruber</i> (Sonnini)
	<i>Eurycea bislineata</i> (Green)
	<i>E. longicauda</i> (Green)
	<i>E. gutt-lineata</i> (Holbrook)
Amphiumidae	<i>Amphiuma means</i> Garden
Proteidae	<i>Necturus maculosus</i> (Rafinesque)
Sirenidae	<i>Siren lacertina</i> L.

10. Influence of Algae within the Eggs of *Ambystoma* Upon Hatching of Their Eggs.

Amos M. Showalter; *Madison College*.

Further evidence of a symbiotic relationship of alga to salamander embryo is presented and a tentative outline of the life history of the alga is proposed.

11. Phases of Nematocyst-Formation by *Hydra* and the Structure of Its Penetrant's Tube or "Thread".

Bruce D. Reynolds, William A. Kepner, Lewis Goldstein and James H. Taylor; *University of Virginia*. (A Demonstration.)

There are three parts to a penetrant: a sac; an axial, compound eversible region, and a spiral thread. This type of nematocyst is (as are other types), elaborated by a cnidoblast.

A multipotent interstitial cell, with a reticular nucleus that lacks a nucleolus, is differentiated to become a cnidoblast. This differentiation leads to considerable growth of the interstitial cell and to the formation of one or two nucleoli within its nucleus.

A vacuole, into which is secreted a colloid-like substance, is formed within the cytoplasm of the growing cnidoblast. This mass of colloidal substance, just before reaching maximum size, is pear-shaped with the bent neck of the stem lying in a pocket by the nucleus of the cnidoblast. The pear-shaped mass finally becomes an oval mass of material that appears to be homogeneous. The oval mass dehisces peripherally to form the spiral thread. Before the peripheral dehiscence is completed, it dehisces axially to form the compound, barbed eversible region. In the meantime the cnidoblast lays down the wall of the sac.

The spiral thread is not an inverted tube but is solid. This inference has a three-fold basis: (1) The caliber of the thread is so small that friction would demand an incredible amount of force to discharge the thread were it an inverted tube. (2) Neither in the developing thread nor in the mature, undischarged one is a lumen to be seen. (3) The coiled resting thread of a mature penetrant has been determined to be as long as this thread after it is discharged.

BOTANY DIVISION

SATURDAY, MAY 9—9:00 A. M.

1. Cytogenetic Studies on Martyniaceae.

Bruce A. Perry; *The Blandy Experimental Farm, University of Virginia.*

The literature on the Martyniaceae is chiefly taxonomic, the descriptions are conflicting and confusing. The somatic chromosomes of *Proboscidea fragans* Dec., *P. jussieui* Keller, *P. jussieui* X *fragans*, *P. fragans* X *jussieui*, and *Ibicella lutea* Van Es. were found to be the same in number, $2n = 30$, and appeared to be the same in size. Species variability is not correlated with any observable cytological difference. *P. jussieui* and *P. fragrans* cross readily in either direction. F_1 , F_2 and backcross populations between the purple flowered, *P. fragrans*, and the white flowered, *P. jussieui* indicated that purple is dominant to white and that the difference in flower color was produced by a single gene. The similarity of the plants indicate that they belong to the same species. Reciprocal crosses of *P. jussieui* X *I. lutea* and *P. fragans* X *I. lutea* failed, except for one seed obtained from a cross of *I. lutea* on to *P. fragrans* as seed parent. The F_1 plant was purple flowered. Fruit petioles were intermediate in length between those of the two species. Further genetic analysis must await culture of the F_2 .

2. Three Extraordinary Experiences with Plants.

Orland E. White; *The Blandy Experimental Farm, University of Virginia.*

These experiences have to do with three common or relatively common cultivated plants, namely: *Eichornia crassipes*, the water hyacinth; a form of the pod type of *Zea mays* that was cobless, and a lavender flowered form of the crepe myrtle, *Lagerstroemia indica*.

Commonly the water hyacinth is killed by the winters of Brooklyn, New York, but in this case several plants survived a below zero winter on the edge of an exhibit pond, but their asexual descendants did not survive the following winter. No explanation is offered and the plants did not set seed, but it indicates that environmental conditions, perhaps of a rather simple type, may condition plants at times to much greater cold resistance.

Seeds of *Zea mays* generally retain their ability to germinate for from 3 to 5 years, and in extremely rare cases, 8 years. Three grains of the type mentioned above were sent home to Panama, by a student of mine whose father planted them. These were 28 years old and had been preserved in naphthalene flakes as exhibit material. One of the three grains germinated, grew 2-3 inches and died.

Certain types of horticultural woody plants are well known to exhibit "shock" effects when transplanted and it may be a season or more before they resume growth. A crepe myrtle with a trunk of over an inch in diameter was transplanted from a local nursery with a ball of earth, to my home grounds. For the first 2 years the bark near the base indicated life was present, although it did not leaf out. By the third year, it seemed to be dead and I sawed it off near the ground and forgot about it. The plot was meanwhile intensely cultivated as a flower garden. Seven years from the time it was transplanted elapsed before the old stump showed signs of life through the production of shoots, which strikes me as a remarkable case of dormancy.

3. Investigations on Chromosome Aberrations in *Phlox*.

James R. Meyer; *The Blandy Experimental Farm, University of Virginia.* (Introduced by Orland E. White.)

This paper deals with a preliminary survey of polyplody and structural change in the genus *Phlox*. Four tetraploid forms ($2n = 28$) occur among diploid plants of wild *P. subulata*. Four plants of *P. suffruticosa* Miss Lingard are triploid ($2n = 21$). These have a high frequency of chiasmata and usually 7 trivalents at metaphase I. Plants of *P. paniculata* Jules Sandeau and one clone of *P. amoena* usually have 6 bivalents and 2 univalents at metaphase I. A plant of *P. paniculata* Mrs. Jenner has at least 2 chromosomes heterozygous for an inverted segment, and 8 centric fragments. Spontaneous chromosome breakage and recombination occur in a wild form of *P. paniculata*. Plants of *P. paniculata* Comus, *P. paniculata* Europe and *P. paniculata* Bridesmaid usually have 5 bivalents and one quadrivalent at metaphase I. In *P. stellaria* 8.5% and in *P. paniculata* Beacon 43.9% of the figures at second meiotic anaphase have chromatid bridges without fragments.

4. The Influence of Carbon Tetrachloride on the Toxic Efficiency of Certain Volatile Organic Compounds.

R. N. Jefferson; *Virginia Agricultural Experiment Station, Blacksburg.*

The dosage-mortality curves of methyl bromide, methyl formate, ethylene dichloride and carbon tetrachloride for *Tribolium castaneum* (Herbst) at 30° C. and 2 hours exposure are presented.

The dosage-mortality curves obtained from mixing carbon tetrachloride with methyl bromide, methyl formate, or ethylene dichloride in several proportions are presented. The mixtures were prepared on the basis of the median lethal concentrations of the gases in the proportions of 1:1, 1:3, and 3:1.

Criteria are given for the demonstration of synergism and antagonism in the mixtures on the basis of the position of their dosage-mortality curves with respect to the curves of their components.

Bliss' method for the quantitative analysis of synergistic action is believed to be of limited value in fumigation experiments.

In general, the effect of carbon tetrachloride when mixed with methyl bromide, methyl formate or ethylene dichloride is to reduce their toxicities to *T. castaneum* at 30° C. and 2 hours exposure.

5. Influence of Carbohydrate Supplements on Ammonification and Nitrification of Urea and Calcium Cyanamid in Plant Bed Soils.

R. G. Henderson; *Virginia Agricultural Experiment Station, Blacksburg.*

Heavy applications of urea and calcium cyanamid to soil to be used for growing tobacco plants gives a partial sterilization of the soil. It has been assumed that the toxic agent is the ammonia released during the decomposition of these fertilizers by certain soil organisms. It has been observed that the formation of ammonia and the oxidation of ammonia to nitrates do not proceed in different soils at the same rate. Carbohydrates amendments were added to the soil to see if the rate of ammonification and nitrification could be altered.

Stable manure and blackstrap molasses were added to some plots several days prior to treatment and to others at the time of treatment. In addition, blackstrap molasses were added to some plots several days after the treatment. Analyses were then made at intervals to determine the ammonia- and nitrate-nitrogen in the soil and also the pH and oxidation-reduction potential of the soil. Where urea was applied, nitrates were more abundant, the pH dropped more rapidly, and the oxidation-reduction

potential rose more rapidly in the ammended soil. Ammonification appeared to be complete in both the ammended and the unammended soil in about three weeks; however, 16 to 20 mgm ammonia-nitrogen per 100 grams of soil was still present in all plots at the end of 126 days. Where calcium cyanamid was applied, ammonification and nitrification proceeded at about the same rate on both the ammended and unammended soil.

From these studies it appears that carbohydrate amendments may be used effectively in accelerating the rate of nitrification in soil treated with urea, thus shortening the toxicity period in soil treated with this material.

6. Practical Uses of Plant Hormone 1-Naphthalene Acetic Acid.

Lester Van Middlesworth; *Piedmont Apple Products Corporation, Charlottesville.*

Large scale experimental results indicate that 1-naphthaleneacetic acid largely prevents "pre-harvest drop" of apples.

Other effects of this hormone are the promotion of root growth, and parthenogenetic production of "seedless" fruit.

Experiments indicate that this plant growth hormone inhibits the growth of some fungi.

7. Comparative Respirational Rates of a Xeric-hydric Series of Bryophytes.

Paul M. Patterson; *Hollins College.*

The respiration of a xeric-hydric series of bryophytes was determined as a possible clue to metabolic differences between ecologically diverse types. Although the comparison of different species presents a number of uncertainties, differences between bryophytes obtained are thought to represent, in part, real differences. The evidence seems to indicate that the mesic species have a greater respirational rate than either of the ecological extremes.

8. Mosses from Mountain Lake.

Paul M. Patterson; *Hollins College.*

Five species of *Sphagnum* and 17 other species of mosses were reported. Their geographical distribution in the U. S. and their local frequency were noted. 11 mosses were reported as locally very infrequent or rare.

9. Results of Tomato Spray Tests.

R. G. Henderson and S. A. Wingard; *Virginia Agricultural Experiment Station, Blacksburg.*

Comparative tests were conducted on Earliana, Pritchard and Marglobe tomatoes in 1941, using tribasic copper sulphate, Bordeaux mixture and yellow copper oxide each as a spray, and tribasic copper sulphate and red copper oxide each as a dust. The Earliana variety received 6 applications of the fungicides but the other two received only five applications. Septoria and Alternaria leaf spots were the principal diseases present. The plants were set in the field June 2, 3 and 4; fungicidal treatments began July 1 and followed at 9-day intervals.

Dry weather in late summer and early fall interfered with the results obtained on the Pritchard and Marglobe varieties. The treatments, nevertheless, resulted in increased yields even on these varieties. On Earliana, the early maturing variety, all treatments gave highly significant increases in yield over the untreated plants; and the tribasic copper sulphate and yellow copper oxide sprayed plants also gave significant increases over the ones sprayed with Bordeaux. The increases from tribasic copper sulphate and red copper oxide dusts over Bordeaux were just short of being significant. On Pritchard, all treatments, except Bordeaux, gave significant increases over the untreated plots. On Marglobe, the late ma-

turing variety, drouth seriously interfered with yield; and on this variety, tribasic copper sulphate was the only treatment that resulted in a significant increase in yield.

10. Some Blue-Green Algae of North Carolina.

Elton C. Cocke; *Wake Forest College*.

Very little systematic work has been attempted on the Cyanophyceae of North Carolina until recently. During the past two years extensive collections have been made in the Wake Forest vicinity and in Haywood County. As a result of this study some 34 species have been added to the Cyanophycean flora of North Carolina. One of these is believed to be new to science.

ZOOLOGY DIVISION

SATURDAY, MAY 9—9:00 A. M.

1. A Check-List of the Chordates of Virginia.

John W. Bailey; *University of Richmond*.

The list of Chordates recorded as having been found within the borders of the Commonwealth of Virginia includes 897 species and varieties. Others occur in the general region in which Virginia is situated, and will probably be included in the printed list, which is expected to appear at a later date.

The number of species listed under each classification, along with the adopted nomenclature of each group is as follows:

<i>Fishes</i> ,	310; Check List of the Fish and Fishlike Vertebrates of North and Middle America by Jordon, Evermann and Clark, 1930.
<i>Amphibians</i> ,	53; Check List of North American Amphibians and Reptiles by Steineger and Barbour, 1939.
<i>Reptiles</i> ,	48; Check List of North American Amphibians and Reptiles by Steineger and Barbour, 1939.
<i>Birds</i> ,	376; A. O. U. Check List of North American Birds, 1931.
<i>Mammals</i> ,	110; List of North American Recent Mammals, Miller, 1923.

The author expects to publish within the next year: "The Mammals of Virginia"; "The Amphibians of Virginia," and "The Reptiles of Virginia." The manuscripts are now ready. Printing will get under way just as soon as a "backer" is found. If possible illustration will be used.

2. A Preliminary Report on the Reproductive System of the Ribbed-Mussel, *Volsella demissus* Dillwyn.

Roy P. Ash; *Virginia Fisheries Laboratory, College of William and Mary*.

3. Notes on the Turbellarian Fauna of the Rochester, (N. Y.) Area. I. Anatomy of *Macrostomum ontarioensis* n. sp.

Frederick F. Ferguson; *Norfolk College of William and Mary-Virginia Polytechnic Institute*.

Notes on the Turbellarian fauna of Monroe County, N. Y., with special reference to the ecology, morphology and taxonomy of *Macrostomum ontarioensis* n. sp.

4. Breeding Habits of the Gray Squirrel in Virginia.
Abnormal Pelage of the Gray Squirrel.
Richard H. Cross, Jr.; *Virginia Polytechnic Institute*.
5. A Taxonomic Distinction Between *Cyllene robiniae* (Forst) and *Cyllene caryaee* Gahan.
Edward W. King; *Virginia Polytechnic Institute*.

Observations were made upon wings of a series of 11 and 28 individuals *Cyllene caryaee* Gahan and *Cyllene robiniae* (Forst.), respectively. It was found that the two species could be distinguished by means of the relative density of color in certain regions of the wing; particularly in the discal cell and in the vennus. The wing of *C. robiniae* shows considerable pigmentation in these areas, contrasting markedly with the wing of *C. caryaee*, which exhibits little or no pigmentation in the vannus and the discal cell.

An examination of wing venation, pubescence, and chaetotaxy yielded no distinction between the two species.

6. A Study of the Incidence and Pathogenicity of *Chabertia ovina* in Sheep.

W. L. Threlkeld; *Virginia Agricultural Experiment Station, Blacksburg*.

There has been considerable conflict of opinion in the United States as to the pathogenic importance of *Chabertia ovina*, the large-mouth bowel worm of sheep. Wetzel, R., 1931, indicated that the macroscopic lesions involved were relatively slight and, microscopically, that while glandular epithelium of the large bowel was destroyed there was not sufficient evidence at hand to characterize the parasite as a blood sucker.

The work of Australian workers in 1933-1936, notably Ross, I. C., Kauzal, G., Gordon, H. McL, and Graham, N., indicates that *Chabertia ovina* is of considerable pathogenic importance. These workers, however, were unable to establish massive infestation in experimental animals nor to determine the role of the adult worm in affecting the pathogenicity in the host.

The study here reported deals with the seasonal prevalence of this parasite in Augusta County, Virginia. An attempt also will be made to obtain more information on the biology of *Chabertia ovina* and to determine the effects produced by the adult worm on parasite-free lambs.

7. Notes on the Musculature of the Male Genitalia of *Haemonchus contortus*.

W. L. Threlkeld and M. E. Henderson; *Virginia Agricultural Experiment Station*.

A study of longitudinal and cross sections through the posterior region of the male nematode, *H. contortus*, shows: That the gubernaculum is supported and slightly activated by longitudinal and transverse muscles and that the location of these muscles implies that slight movement is possible in three directions.

Other muscles are described and their functions are explained on the basis of their origins, insertions, and locations: (a) Muscles 1 and 3, each named *Retractor spicularis lateralis*, function—to retract the spicule. (b) Muscle 2, *Retractor spicularis contralis*, function—to extrude the spicule and assist in contraction of the bursa. (d) Muscle 5, *Dilator cloacae*, function—to dilate the cloaca. (e) Muscle 6, *Bursa expansa*, function—to expand the bursa.

Spermatozoa contained in gelatinous capsules are found in the grooves formed by the longitudinal spicular ridges.

Rectal glands are shown proximal to the intestine.

Transverse sections in series from the rectal gland to the cloaca show the relationship of the accessory reproductive organs, intestine and cloaca.

8. Identification of the Larval Stages of the Blue Crab, *Callinectes sapidus* Rathbun.

Sewell H. Hopkins and John H. Lochhead; *Texas A. and M. College and Virginia Fisheries Laboratory, College of William and Mary.*

The first two instars of the blue crab "zoea" are described and figured in detail from specimens hatched and reared in the laboratory. In external morphology they show close agreement with the published descriptions of the zoeae of certain other portunid crabs. It cannot yet be said how easily the zoeae of *Callinectes sapidus* can be distinguished from the zoeae of the five other species of Portunidae found in and near the waters of the lower Chesapeake Bay, since none of the latter larvae have been described. A study of Chesapeake Bay plankton suggests that the blue crab zoea may pass through as many as six instars, but confirmation of this fact by rearing experiments is desired.

9. Hatching the Larvae of the Blue Crab, *Callinectes sapidus* Rathbun.

Margaret S. Lochhead and Curtis L. Newcombe; *Virginia Fisheries Laboratory and Biology Department, College of William and Mary.*

10. Observations on the Catfish Fishery of the James River Area.

R. W. Menzel; *Virginia Fisheries Laboratory and Biology Department, College of William and Mary.*

An investigation was begun, at the request of several commercial fishermen, on the commercial catfishery of the state. The primary purpose was to determine means of conservation of the fishery.

Observations were made on the importance, distribution, reproduction, migration, food habits, growth, methods of capture, methods of handling, and means of repletion.

It was found that there is a need for better statistics not only for the catfish but for all of the fisheries of the state. Although, according to the statistical reports, the catch has remained fairly constant for the last ten years, the fishing intensity was found to have almost doubled. The average size of the fish has decreased by half and unless measures are taken to improve the situation the fishery may not be profitable longer than another five years. Also it was found that the fishery is much richer on the James River than the statistical reports tend to indicate. Where it is found the catfish is the most important fish of the James River.

The following recommendations were made:

1. Limit the minimum size of the white bullhead cat to be taken to 8 inches and the willow cat to 10 inches.
2. Have a closed season of one month from June 15th to July 15th during the spawning season.
3. Require the fishermen to cull the small fish from the boats immediately while they are still alive.
4. Secure better statistics so that the trend of the fishery may be followed more closely.
5. Encourage the fishermen to cooperate with one another in securing better prices and to advertize their fish outside of the state. It is believed that if the fishermen could grade and advertize their fish as an unit from the James River, they could through cooperative bargaining get better prices.

MINUTES OF THE
SECTION OF CHEMISTRY

F. H. FISH, *Chairman*

L. J. DESHA, *Secretary*

FRIDAY, MAY 8—9:30 A. M.

1. The Chemistry of Alcoholic Fermentation.

Lester Van Middlesworth; *Piedmont Apple Products Corporation, Charlottesville.* (15 min.)

A brief review of the development of the modern accepted theory for the chemical mechanism of alcoholic fermentation. The work in progress seeks better industrial application of this theory to obtain the desired alcohols in larger yields. Experimental results obtained by the use of pure cultures and different media were presented.

2. Qualitative and Quantitative Tests for Acetic Acid.

J. B. Lucas, Fred W. Bull and E. P. Painter; *Virginia Polytechnic Institute.* (12 min.)

Most attempts in the past to test for acetic acid have been made with inorganic reagents. However these tests are of little value in making quantitative determinations. Beilstein, Feigel, Zappart, and Vasquez, German chemists, approached the problem from an organic standpoint by converting acetic acid into acetone before testing. Their work to date has shown some promise.

In this investigation, two methods for determining acetic acid by organic means have been attempted. The tests were carried out by two precipitation methods and two titration methods. The first precipitation method utilized 2, 4, dinitrophenylhydrazine; the second method utilized the iodoform reagent as the precipitating agent. The titration tests involved the use of: (1) iodoform reagent, caustic soda, and hydrochloric acid, and (2) potassium iodide, sodium hypochlorite, caustic soda, and hydrochloric acid. The results obtained, together with the difficulties encountered in each method, were discussed.

3. Dissolution of Urinary Calculi.

P. C. Scherer and L. W. Claffey; *Virginia Polytechnic Institute.* (10 min.)

Urinary calculi might be expected to dissolve if treated with certain solutions. Experiments showed that citric acid, phosphoric acid, tartaric acid, benzoic acid, and various mixtures of acids and salts dissolved only small amounts. Albright's citrate buffer appeared to be the best and dissolved about 12.5% by weight.

Assuming the calculi to be composed of inorganic salts deposited in a medium of an organic binding substance, attempts were made to decompose the organic matter by treating the stones with various enzymes so as to expose the inorganic matter to the solvent action of citrate solutions. Of the available enzymes, urease appeared to give the best results since in a number of cases complete solutions were obtained by long time treatment with the enzyme followed by digestion with citrate buffer solution.

The relation between time of enzyme treatment and amount dissolved thereafter by constant digestion with Albright's citrate buffer showed that the enzyme action is initially very rapid but slows down at longer time.

4. A Modification of the Freas and Provine Synthesis of Phenol Red.

J. B. Lucas and H. J. Osborn; *Virginia Polytechnic Institute*. (10 min.)

Phenol red can be obtained with about 30% yield from saccharin by the following method:

Mix 25 grams of phenol with 10 grams of insoluble saccharin and add 12 cc. of concentrated sulfuric acid. Digest at about 120° C for 48 hours. Allow to cool and dissolve in about 200 cc. of water. Remove the excess sulfuric acid by quantitative precipitation with saturated barium hydroxide. Filter and evaporate to dryness. Pulverize, and extract the unreacted phenol with ether. Dry again and extract the phenol red with absolute methanol. The product obtained by the evaporation of the methanol is pure enough for practical purposes. A better product can be obtained by recrystallization from either water or methanol.

5. The Nitration of Lepidine and 2-Chlorolepidine.

Stanley E. Krahler and Alfred Burger; *University of Virginia*. (15 min.)

The nitration of lepidine and 2-chlorolepidine has been investigated by Krahler and Burger (J. Am. Chem. Soc. 63, 2367 [1941]), and by Johnson and Hamilton (ibid., 63, 2867 [1941]). These authors did not arrive at the same conclusions about the position of the nitro group introduced into 4-methylquinoline, placing it in position-8, while we had deducted position-5 for the new substituent. Our conclusion was based on the fact that 8-chloro-2-hydroxylepidine had been prepared by Kermack and Muir (J. Chem. Soc. 1933, 300) and by Monti and Cirelli (Gazz. chim. ital. 66, 723 [1936]), and that our chloro-2-hydroxylepidine, the reference compound in this series, exhibited different physical properties. The subject was reviewed, and the correct structure of the compounds in question discussed.

6. Vapor Phase Hydrolysis with Copper Catalysts Prepared from Complex Compounds.

James W. Cole and L. Van Middlesworth; *University of Virginia*. (10 min.)

Catalysts prepared by reduction of copper from copper triethanolamine salts onto siliceous carriers promote the hydrolysis of halogenated aromatic hydrocarbons to phenols. Experimental results were presented to show the effect on conversion and catalyst activity, of method of catalyst preparation, nature and particle size of carrier, temperature of reaction system, and presence of halogen hydride.

7. Desulfurization of Rayon by Organic Solvents.

P. C. Scherer and W. M. Davis; *Virginia Polytechnic Institute*. (5 min.)

Experiments by Scherer and Leonards showed that if crude viscose rayon be first swollen with water, the sulfur present could be completely extracted by organic solvents. Assuming that such treatment should have less harmful effect on the physical properties than an hour treatment with 0.5% sodium sulfide solution at 80°, a comparison was made between rayon desulfurized (after swelling) with hot methyl alcohol and an alkali desulfurized rayon. The tensile strength, wet and dry, and the elongations, wet and dry, were measured. The methyl alcohol method in no case showed worse physical properties. There appeared to be an increase in elongation for the methyl alcohol treated yarn as compared to that of the alkali desulfurized material.

8. Reactions of Cellulose in Liquid Sulfur Dioxide.

P. C. Scherer and L. W. Brooks; *Virginia Polytechnic Institute.* (5 min.)

The usual reactions of cellulose with reagents were attempted, using liquid sulfur dioxide as a solvent medium. Nitrations were impossible since the nitrating agent reacted with the solvent to give nitrosyl sulfuric acid. Chlorination and esterification reactions showed no tendency to proceed. Etherification and xanthation, did not take place since the soda cellulose needed in these reactions reacted with the solvent to give sodium sulfite cellulose.

Hydrolysis of cellulose to reducing sugars took place readily. Subsequent washing with sulfur dioxide removed two thirds of the excess sulfuric acid from the product. Dispersion in liquid ammonia neutralized the remaining acid to insoluble ammonium sulfate, and dissolved the reducing sugars. Filtration removed all the insoluble salts and the reducing sugars were obtained pure by simple evaporation of the ammonia.

9. Reaction between Cellulose Nitrate and Diethylamine.

P. C. Scherer and C. F. Rogers; *Virginia Polytechnic Institute.* (5 min.)

Cellulose nitrate (11.7% nitrogen) and diethylamine react vigorously with elevation of the temperature. A brown amorphous powder may be isolated from the residue by extraction of the impurities with chloroform. This brown powder gave an amino nitrogen content of 9.0%, comparing favorably with 8.6% nitrogen for a diaminodiethylcellulose. A yield of 40% theory is obtained.

If carried out by adding a solution of diethylamine in peroxide free ether to the cellulose nitrate, the violence of the reaction is modified and a brown amorphous product may be obtained by treatment with chloroform. This product contained neither nitrite, nor nitrate nitrogen, but analysis gave 12.84% amino nitrogen compared to 12.82% for the theoretical triaminodiethylcellulose. The product was very soluble in water, very slightly soluble in chloroform and acetone, insoluble in benzene, ether, and carbon tetrachloride.

10. The Saccharification of Wood.

P. C. Scherer and F. I. Brownley; *Virginia Polytechnic Institute.* (5 min.)

A study of the conversion of wood to reducing sugars was made by four methods: (1) Hydrolysis with concentrated acids; (2) Hydrolysis with alkalies; (3) Hydrolysis with dilute acids; (4) Combination of chlorine treatment followed by hydrolysis with dilute acids.

When wood was hydrolysed with concentrated sulfuric or hydrochloric acid, the yield of reducing sugar was only about 0.12% of the wood. When solutions of sodium hydroxide were used a yield of only 0.04% of the wood was obtained as sugars. Alternate treatments by alkali and by acids did not increase the yields.

Hydrolysis with dilute sulfuric acid at 100°C for times up to one hour gave about 6.5% reducing sugars. Chlorination of the wood followed by hydrolysis with dilute sulfuric acid gave a maximum yield of about 24.4%, based on the wood, if the cycle were repeated four times.

11. Some Conservation-For-Defense Ideas Applicable in Chemical Laboratories.

Robert F. McCrackan; *Medical College of Virginia.* (12 min.)

While adjusting laboratory programs to rising prices, slow deliveries, priority regulations and unprecedent shortage of certain important materials, the laboratorian's resourcefulness is meeting an unusual challenge.

Some adaptations and changes in experimental procedures, suggested by present temporary conditions, were described and demonstrated.

12. The Southern Association of Science and Industry.

Wortley F. Rudd; *Medical College of Virginia.* (5 min.)
A summary of the organization and objectives of this Association.

13. A Biography of the Neutrino.

Arnold M. Lansche; *Randolph-Macon College.* (8 min.)

The neutrino theory was traced, from its beginning with James Chadwick's work in 1933, through the developments of 1941. The more important investigations were summarized and appraised.

14. Chemical Warfare—Offensive and Defensive.

R. G. Robb; *College of William and Mary.* (20 min.)

Chemical warfare is as old as man's knowledge of chemistry. Fire and Sword have been twin agencies of destruction in all the wars of the world.

A second phase of chemical warfare made possible by gunpowder revolutionized all warfare, and gave dominion of the earth to the nations which knew how to use it. For four hundred years gunpowder reigned supreme on the battlefield, and not until near the end of the nineteenth century was it replaced by more powerful chemical explosives.

During 1914-1918 many chemicals emerged as new chemical warfare agents. Among these, poison gases were the most sensational and almost gave victory to the Germans.

The most publicized chemical warfare achievement today is the development of extremely efficient incendiaries—so that Fire, the oldest chemical weapon, looms again as one of the most terrible. Another outstanding development has been the widespread use of chemical smokes for screening warships, and for blinding defense gunners as in the capture of Eben Emael, the key fort on the Belgian border.

The possibility of a surprise poison gas attack in overwhelming quantity still gives headaches to the strategists of all warring nations. Poison gas was perhaps the most efficient casualty-producing agent used in the first world war, and only an incurable optimist would fail to reckon with the chance that it may be used in the last bitter battles of this war if either side believes it will bring them victory or stave off defeat.

15. A V.A.S. Member Studies the Economic Situation of the Dominican Republic.

Joseph Z. Schneider; *Madison College.* (20 min.)

The speaker was one of eight experts sent in 1941, by the Brookings Institute of Washington, D. C., to study the economic situation and possibilities of the Dominican Republic. He discussed the purposes of the survey, the factors studied and the methods applied, and summarized some of the more important findings. Emphasis was laid on climate, mineral deposits, agricultural raw materials, sources of energy, fuels, chemical industry, national wealth, and national income. The work of the survey was evaluated both in terms of its original purposes and as to its usefulness in the study of other Latin American countries.

16. Photo-Electric Measurement of Submarine Illumination.

C. L. Newcombe, G. W. Ewing and A. R. Armstrong;
College of William and Mary. (10 min.)

Apparatus available for the determination of submarine illumination was described. Values showing the penetration of sunlight into the York River and lower Chesapeake Bay waters were presented and compared to similar values obtained in certain other bodies of water. A tentative correlation was made between increasing turbidity and decreasing oyster beds in terms of the effect of illumination upon the food supply of oysters.

FOURTH SYMPOSIUM ON
ORGANIC ANALYTICAL REAGENTS

FRIDAY, MAY 8th—2:00 P. M.

17. Introduction.

John H. Yoe; *University of Virginia*. (5 min.)

18. A Progress Report on Analytical Organic Reagent Studies.
W. J. Frierson; *Hampden-Sydney College*. (5 min.)

19. Organic Reagents for the Determination of Iron.

Wm. E. Trout, Jr.; *Mary Baldwin College*. (15 min.)

More than one hundred organic compounds have been employed in one way or another for the determination of iron. The paper presented a summary of these reagents and a comparison of the better ones.

20. 8-Mercaptoquinoline Studies.

W. L. Bruce and J. R. Taylor; *Washington and Lee University*. (5 min.)

8-Mercaptoquinoline has been synthesized and its analytical reactivity has been compared with that of 8-hydroxyquinoline (oxine) by the standard drop reaction procedure.

21. Structure and Analytical Reactivity.

J. R. Taylor; *Washington and Lee University*. (15 min.)

A discussion of the effects on analytical reactivity of replacing oxygen by bivalent sulfur in organic compounds capable of forming complexes with metallic ions.

22. The Reactivities of Certain Organic Compounds with Inorganic Ions.

F. H. Fish, P. J. Walkauskas and M. Fox; *Virginia Polytechnic Institute*. (5 min.)

More than twenty-five organic compounds have been investigated by spot plate technique with about seventy-five inorganic ions under various experimental conditions. A summary of this work was presented.

23. A Progress Report on Inorganic Analysis With Organic Reagents.

E. Louise Wallace and Alfred R. Armstrong; *College of William and Mary*. (5 min.)

24. Organic Solvents and Wash Liquids.

Landon A. Sarver; *American Viscose Corporation*. (20 min.)

The various uses for which organic liquids may be employed in analytical chemistry, and the properties which govern the choice of a suitable agent were reviewed. Organic liquids were classified according to structure, and a few examples were cited in each class. Finally, the application of an organic solvent to a new method of industrial analysis, the determination of sodium cellulose xanthate in viscose, was described. In connection with this method, a new piston pipet for delivering liquid samples was demonstrated.

25. *syn*-Dianisalacetoneoximehydroxylamine as a New Organic Reagent for the Gravimetric Determination of Tungstates.
A. Letcher Jones and John H. Yoe; *University of Virginia*. (15 min.)

syn-Dianisalacetoneoximehydroxylamine precipitates tungstates from acid solution. The *anti* isomer of the same compound is unreactive with tungstates. In normal synthesis both compounds are formed, but may be separated on the basis of difference of solubilities in alcohol.

26. Sodium Catechol Disulfonate as a New Colorimetric Reagent for Iron.

A. Letcher Jones and John H. Yoe; *University of Virginia*. (5 min.)

Preliminary investigations of this compound show that it is highly sensitive for ferric ions, producing colored solutions of high stability.

27. Spectrophotometric Studies of Some Complex Copper Compounds.

James W. Cole, M. Brooks Shreaves and James E. Bowden; *University of Virginia*. (20 min.)

Employing a Beckmann quartz spectrophotometer, optical densities over the wavelength range 350 to 1500 millimicrons were obtained for aqueous solutions of copper ammines and copper ethanolamines. Variation of the ratio of concentration of "complex-former" to elementary ion and comparison with solutions made from pure solid complex compounds lead to the conclusion that there exists a series of complex ions containing from one to six mols of "complex-former" per gram ion of copper.

28. Studies in Organic Analytical Reagents: New Colorimetric Reagents for Silver, Copper, Cobalt, Zirconium, and Phenothiazine.

John H. Yoe and Lyle G. Overholser; *University of Virginia*. (20 min.)

2-Thio-5-keto-4-carbethoxy-1,3-dihydropyrimidine may be used for the detection or colorimetric determination of small amounts of silver. The sensitivity, interference of various ions, effect of pH, etc., have been studied.

2,4-Diacetoxybenzonitril has been found to be a sensitive colorimetric reagent for the detection of copper.

Visual and spectrophotometric studies of *o*-nitrosoresorcinol as a reagent for cobalt indicates that it is applicable to the determination of small quantities of this element.

5-Chlorobromamine acid has been applied to the detection of zirconium.

The reaction between phenothiazine (thiodiphenylamine) and palladous chloride forms the basis for the colorimetric determination of small amounts of phenothiazine.

29. Reactivity of Substituted Thioureas.

Lyle G. Overholser and John H. Yoe; *University of Virginia*. (5 min.)

The reactions of sixty substituted thioureas with seventy-eight inorganic ions have been observed and the sensitivities of the most sensitive ones have been determined.

SYMPOSIUM ON MEDICINAL CHEMISTRY

SATURDAY, MAY 9—9:00 A. M.

30. Introduction.

Alfred Burger; *University of Virginia.*

31. Recent Developments in Medicinal Chemistry.

C. R. Addinall; *Merck & Co., Rahway, N. J.*

The discovery and application of the sulfanilamides—the second major phase in the development of chemotherapy—have thrown much light on the importance of the relation of chemical structure to therapeutic activity. Recent investigations in various other fields of medicinal chemistry have shown the value of this orienting principle in interpreting the mode of action of chemical compounds and devising new and better medicinal agents. The investigation of the vitamins of the B complex, the search for drugs with antiplasmodial action, the development of newer anesthetics, the study of synthetic hormones and the application of sympathomimetic drugs to war-time uses are recent developments of medicinal chemistry which have relied upon and contributed much to this principle.

32. Sulfanilamide Chemistry.

Jackson P. English; *American Cyanamid Company, Stamford, Conn.*

The initial step in attacking the riddle of the relation of the activity of Sulfanilamide drugs to their constitutional formulae occurs in the organic laboratory where a series of planned structural variants of the parent compound is prepared. When the chemist is sure of the purity and identity of his compounds they are turned over to the bacteriologist for the testing of their chemotherapeutic properties. Before attempting to correlate these results with his chemical facts, the chemist must keep in mind the series of factors operating in the bacteriological laboratory, where lack of control could vitiate the most carefully planned synthetic program. However, enough structural variants of sulfanilamide have been carefully studied to permit some general idea of the influence of these variations to emerge. Unfortunately, the general effect is one of taboo, with hardly a hint of the course to be taken for the achievement of enhanced activity.

The paper consisted of a discussion of these statements, with examples.

33. Chemistry and Pharmacology of Newer Local Anesthetics.

J. Stanton Pierce and H. B. Haag; *University of Richmond and Medical College of Virginia.*

A study of the structure of the widely used local anesthetics reveals certain groupings common to most of these compounds. However, no single group is present in all of the compounds which display pronounced local anesthetic action and no single compound contains all of the functional groups to which anesthetic action may be attributed.

Comparison of the structural formulas of eucupin, nupercain, and monocaine with procaine (novocaine) or cocaine illustrates the fact that marked changes in the latter compounds can be made without destroying anesthetic activity. The local anesthetic action of eucupin and nupercain have been found to be characterized by great persistence of effect when tested either experimentally or clinically. Eucupin is less toxic than cocaine, nupercain more toxic.

A series of compounds, β -monoalkylaminoethylalkoxybenzoates has been prepared, which combine the ether groupings in eucupin and nupercain with the secondary alkylaminoethylbenzoate grouping in monocaine. Of the compounds in this series which have been tested on the rabbit's cornea, the hydrochloride of β -monopropylaminoethyl-*p*-butoxybenzoate proved to be the most effective as a local anesthetic.

34. A Basis for the Chemotherapy of Tuberculosis.

Frederick Bernheim and Alfred Burger; *Duke University and University of Virginia.*

Upon investigating the oxidative metabolism of the tubercle bacillus it was found that these bacteria can oxidize benzoic and *o*-hydroxybenzoic acids but not *m*- and *p*-hydroxybenzoic acids. A nonpathogenic mycobacterium oxidizes benzoic, *m*- and *p*-hydroxybenzoic acids but not *o*-hydroxybenzoic acid. On the assumption that the oxidation of *o*-hydroxybenzoic acid by the tubercle bacillus is an important metabolic process, various drugs were tried for their ability to inhibit the oxidation of this compound and thereby the growth of the tubercle bacillus. The effect of monohalogenated benzoic acids on growth *in vitro* was tried and it was found that *o*-iodobenzoic acid inhibits growth more effectively than the other isomers and also the bromine and chlorine substituted benzoic acids. Increasing the number of iodine atoms substituted in the molecule increases the effectiveness of the inhibition. Thus, 2, 3, 5, triiodobenzoic acid completely inhibits the growth of the tubercle bacillus on veal glycerine infusion broth in a concentration of 1.0 mg. per cent. The position of the substituting groups is, however, important. 2-Hydroxy-3,5-diiodobenzoic acid inhibits at lower concentrations than the 4-hydroxy isomer and this again emphasizes the fact that ortho substitution increases the effectiveness of the compound. A number of substituted 2,4,6-triiodophenoxy ethers have been tested. They affect the metabolism of the tubercle bacillus in different ways, all are inhibitors of growth, but some are too toxic for administration to animals.

35. Chemotherapy of Malaria.

L. R. Modlin, Jr.; *U. S. Public Health Service, Bethesda, Md.*

The various stages of the malarial parasite in the human blood stream consist of the following parasitic forms: Sporozoites, injected by the mosquito; schizonts, resulting from the division of the sporozoites in the red blood corpuscles; merozoites, liberated by the rupture of the red corpuscles; and gametocytes, the sexual form of the parasite which may continue its development in the mosquito. Quinine, the most widely used compound in the treatment of malaria, is a schizonticidal drug and does not prevent the spread of the disease. A systematic search for a drug which would both check the disease and rid the peripheral blood stream of the parasite has resulted in the preparation of several thousand compounds of which plasmoquin, a gametocidal agent, and atabrin, a schizonticidal drug, are the most useful.

36. Minutes of the Business Meeting.

The Business Meeting of the Chemistry Section was called to order by Chairman Fish at 4:40 P. M., Friday, May 8. The Nominating Committee submitted the following report:

The Committee nominates the following members for officers of the Section for the year 1942-1943:

For Chairman: L. J. Desha, Washington and Lee University;

For Secretary: Harry I. Johnson, Roanoke College;
For Journal Representative: J. Stanton Pierce, University of Richmond.

Respectfully submitted,

WM. E. TROUT, JR., *Chairman*,
W. JOE FRIERSON,
W. G. GUY,
IRA A. UPDIKE.

Upon motion, this report was adopted. The meeting then adjourned.

L. J. DESHA, *Secretary*.

MINUTES OF THE
SECTION OF EDUCATION

F. G. LANKFORD, JR., *Chairman*

FRED M. ALEXANDER, *Secretary*

FRIDAY, MAY 8—9:30 A. M. TO 12:30 P. M.

1. Suggestions for an Educational Therapy in Problem and Delinquent Children.

H. Riese; *Honorary Worker with the Richmond Juvenile and Domestic Relations Court, Richmond, Va.*

Two main psychological causes are seen for the failure of problem children with average intelligence to acquire proper knowledge.

1. Lack of intellectual curiosity.
2. Instability and difficulty in concentrating at all or for a sufficient length of time on more or less abstract topics.

Lack of intellectual curiosity with these children is due, as a rule, to environmental conditions. Children having no one to ask questions of or no one to answer them properly will stop wondering. Their outlook at the time will be small; their life aimless. These are some of the reasons for their instability: want of practise, inability to establish a relationship between school knowledge and their problems, ignorance of another than their narrow egoistic world which will cause lack of interest and concentration.

Four means of dealing with these teaching problems are suggested:

1. To create an uplifting, inspiring group spirit in class, promoting unselfish ambitions and fair competition. This will counteract the evil group influence from the outside which, ruling with a strong hand, will frighten weak children into submission.
2. The same individual qualities which account for the child's failure should be used as a basis for promoting ambition and success; what is a weakness should be made an asset.
3. Awaken curiosity which has been slumbering since the questioning time of early childhood. Knowledge corresponding to the chronological age must be given the charm and appeal of that fairyland of infancy which was unexperienced by these children.
4. Intellectual curiosity being once aroused, the child's hostility toward society must be vanquished by using the socializing functions of knowledge to the utmost by establishing widespread and solid ties of human solidarity.

2. Virginia Fisheries Laboratory. Program of Educational Work in Marine Biology for Fisheries and Local Communities.

B. B. Shepherd; *College of William and Mary.*

This program consists of an educational exhibit on the biology of Virginia Fisheries with special reference to the oyster, crab and fin fishes; a color film on the biology of Virginia Fisheries; and a series of pamphlets on the biology and economic importance of commercial forms of tidewater Virginia for the use of high school students and teachers of biology.

During the year the laboratory exhibit is shown to about 40 schools before about 10,000 students, as well as many townspeople.

3. The Use of Evaluative Criteria in Virginia High Schools.

E. C. Shortt; *University of Virginia.*

This study found that all except two of the forty-two Virginia high schools that had been evaluated by the Evaluative Criteria by the end of the 1940-41 session had experienced some degree of improvement as a result of the application of these new measures.

A number of criticisms have been directed at the Evaluative Criteria and their use by principals whose schools have been evaluated. A careful analysis of these criticisms indicates that they should not be interpreted as evidence of dissatisfaction with the Evaluative Criteria, but that they are offered with a view toward improving the instrument to make it more valuable for those who use it in the future. Most of the weaknesses of the Evaluative Criteria as reflected in these criticisms will disappear as schools become familiar with the materials and procedures recommended by the Co-operative Study. Other minor weaknesses can be corrected by slight revisions.

FRIDAY, MAY 8—2:00 P. M.

4. The Scientific Aspect of Supervision.

J. A. Rorer; *Extension Department, University of Virginia.*

Educational literature during the last two or three decades has often employed the term "scientific" very loosely. "Scientific supervision" is only one example.

Writers in the field of supervision claim that supervision is scientific in the following respects:

- a. Supervision employs scientific method in its procedure (i. e.) supervision is or should be scientific.
- b. Supervision utilizes the findings of science by adapting them to classroom use.
- c. Supervision conducts and cooperates in scientific research and experimentation for the improvement of instruction.

This investigation concludes that the first of these claims is not well founded and that the second and third may be accepted only with certain reservations.

5. Discussion of Educational Research in Virginia.

Dr. C. E. Myers; *Supervisor of Research, State Board of Education, Richmond, Va.*

6. Business meeting.

The program proceeded as outlined with the following exceptions: (1) Mr. Wister Harold Ford did not appear as he had previously notified the secretary and did not send his paper, and (2) Dr. Rorer's paper was changed to the afternoon session in order that he could fill a broadcast appointment.

Business Session—Following the discussion of educational research in Virginia, a motion was made, seconded, and carried that the president of

the section appoint a committee of three to confer further with the State Department of Education, the Virginia Education Association, and the Association of Virginia Colleges, seeking their cooperation in the organization of a research council along the lines proposed in the paper submitted by C. E. Myers. This committee was directed by the motion to report to the Executive Committee of the section, and the Executive Committee was given power to act.

Officers were elected as follows: *President*, Fred M. Alexander, Supervisor of Secondary Education, State Department of Education, Richmond, Virginia; *Secretary*, H. W. Sanders, Professor of Agricultural Education, V. P. I., Blacksburg, Virginia; *members of the Executive Committee*, F. G. Lankford, Jr., Ex-officio, retiring president, University of Virginia, Charlottesville, Virginia; and C. E. Myers, Supervisor of Research, State Department of Education, Richmond, Virginia; *member of the Editorial Board of the Virginia Journal of Science*, J. A. Rorer, Professor of Education, University of Virginia, Charlottesville, Virginia.

MINUTES OF THE
SECTION OF ENGINEERING

P. S. DEAR, *Chairman*

J. B. JONES, *Secretary*

FRIDAY, MAY 8—9:30 A. M.

1. Corrosion of Metals by the Constituents of Tallol.

LeRoy Hutzler III and Albert H. Cooper; *Virginia Polytechnic Institute*.

Tallol, a mixture principally of fatty and resin acids, occurs as a waste liquor in the manufacture of Kraft paper pulp. In processing the Tallol for recovery and utilization corrosion problems are encountered. This investigation was carried out to study the relative corrosion characteristics of the constituents of tallol on various metals and to determine the most suitable metals for equipment construction which will satisfactorily withstand the corrosive action.

2. Utilization of Lespedeza sericea for Annual Farm Tannin Crop.

Frank C. Vilbrandt, A. B. Massey and J. Emmett Hines; *Virginia Polytechnic Institute*.

The purpose of this investigation was to ascertain the engineering and economic problems inherent in the conversion of the annual crop of Lespedeza sericea into a new material for tannin extract, or the industrialization of a farm crop.

Through the cooperation of Dr. Massey and his associates, Lespedeza sericea was obtained and extracts were made of the leaves and stalk, first under laboratory extraction methods and then in a pilot plant filter and in a continuous screw conveyor extractor.

Extractions were carried out at 60 to 100° C. at 10° increments from four to ten hours. Approximate costs of production under optimum engineering conditions were calculated.

3. Utilization of Several Virginia Weeds for Annual Tannin Crop.

Frank C. Vilbrandt, A. B. Massey and W. J. Halvorsen; *Virginia Polytechnic Institute*.

The purpose of this investigation was to ascertain the engineering and economic problems which might arise in the utilization of several annual crop Virginia weeds, the persimmon leaf and unripe fruit, and the stick-weed, as a commercial source of tannin extract.

Unripe persimmons were cut and dried; later were extracted with water at 80° C. for varying periods of time from one to ten hours, and tested for tannin by the titration and by the hide power methods.

Stickweed stalk, flower and leaves were separated and extracted under the same condition and tested for tannin by similar methods as above.

4. Rate of Absorption of Carbon Dioxide Monoethanolamine Water Solutions.

J. I. Butzner, A. G. Grant, R. R. Ross and V. C. Williams; *University of Virginia.*

The ethanolamines have proved to be economical in the absorption of acidic gases. They are capable of reducing the absorbable gas content in the inert to low values. Data are badly needed for the commercial design of the absorption and stripping columns. This paper represents a start on the accumulation of stripping data for use in the calculation of such absorption units.

5. Equilibrium Partial Pressures of Carbon Dioxide over Monoethanolamine Water Solutions.

W. P. Cowgill; *University of Virginia.*

For interpretation of rate factors in absorption design, equilibrium data are necessary. A new apparatus has been designed which expedites this determination.

6. Raw Materials for Defense.

Albert H. Cooper; *Virginia Polytechnic Institute.*

A review of our situation in respect to strategic and critical materials for defense production. New processes, new methods, new materials, and progress in industrial expansion for meeting the demands for materials for defense needs and to overcome the shortage for civilian uses.

7. Dehydration of Apples.

Frank C. Vilbrandt and Raymond Friedman; *Virginia Polytechnic Institute.*

Dehydrated apples as a transportable foodstuff for armies and foreign relief is essential. The purpose of this investigation was to ascertain the possibility by control of drying condition of dehydrating apples so as to retain vitamin C content, cell structure, color, flavor, and other desirable characteristics of apples when rehydrated.

York and Stamen apples were peeled, sliced, and dried in a special three tray air conditioned dryer at 125-130° F. under 2, 3, 4, and 5 stage humidity variations at 2 to 16 hour time intervals for each stage until apples showed no increased rate of loss of moisture.

Fourteen to twenty-four hours total drying limits were required. Freshly picked apples required a longer drying time than those retained in storage for three months; the longer periods were 20 to 24 hours while the quick drying were 14 to 16 hours' duration.

The degree of darkening was a function of time at 125-130° F. The lighter quality, better flavored and more readily rehydrate apples resulted from the quicker drying conditions. Vitamin C, a small quantity at best, was eliminated during the dehydration.

8. The Side Entering Mixer as a Gas-Liquid Contacting Device.

J. H. Rushton; *University of Virginia.*

The problem of contacting gas and liquid by a side entering mixer has been studied in a glass sided tank. The effect of a number of variables involved is presented by photographs and in part supported by quantitative measurements of the amount of carbon dioxide absorbed in sodium carbonate solutions.

A propeller type side entering mixer was used. The propeller acted both as a small bubble former and as a propellant. These are contrasting factors and if properly balanced can be made to produce good mixing with

no vortex formation and very small and uniform bubble size. Two propellers acting together on one shaft with gas introduced behind them gave the best results.

Motion pictures are used to show actual operation.

9. Power Measurement for Side Entering Mixers.

F. L. Foerster and W. H. Tucker; *University of Virginia.*

Description of a set-up for measuring power input to a mixing propeller making use of a Strobotac. Power measurements have been made and data on calibration and various mixing conditions are presented.

A small set-up demonstration will be shown to illustrate the convenience of the method.

10. Fluid Flow Patterns as Determined by the Schlieren Method.

H. F. Johnson and V. C. Williams; *University of Virginia.*

The Schlieren method is capable of showing disturbances in gas flow patterns due to the change in the index of refraction, by temperature or pressure. This apparatus gives visual evidence of the patterns resulting from changes in construction of various gas flow equipment. Apparatus and method of operation are described.

11. Float Bodies for the Stabl-Vis Rotameter.

W. H. McCoy, W. W. Mellen, Jr. and J. H. Rushton; *University of Virginia.*

Data are presented on the behavior of float bodies of various sizes attached to a sharp-edged Stabl-Vis disc in a rotameter. From these data the relation between float body size and the viscosity influence on a sharp-edged disc rotameter has been determined.

BUSINESS MEETING

Appointment of Nominating Committee.

The meeting was called to order by Prof. P. S. Dear, Chairman, at the conclusion of the presentation of the papers of the morning session.

The minutes of the last meeting were read and approved. A nominating committee, consisting of Dr. A. H. Cooper and Dr. J. H. Rushton, was appointed to select a slate of officers for the coming year. The committee was instructed to report back to the meeting at its resumption after lunch.

Dr. Frank C. Vilbrandt stated that in all probability a proposal would be made requiring collegiate membership of all students presenting papers, and he would suggest that the Engineering Section give the matter consideration. The chair asked the members to give the proposal careful thought and to be ready to make an expression later. The meeting was then recessed until after lunch.

FRIDAY, MAY 8—2:00 P. M.

Continuation of Business Meeting.

At 2:00 p. m. the business meeting was again called to order. The nominating committee presented the following slate of officers: *Chairman, J. B. Jones; Secretary, Frank C. Vilbrandt;*

Associate Editor, J. H. Rushton. There were no further nominations from the floor and a unanimous ballot was cast for the nominees.

A resolution was then introduced to the effect that the Engineering Section go on record as favoring the continuation of the present membership policy.

The business meeting was concluded at 2:20 p. m. with the resumption of the presentation of the papers for the afternoon session.

12. An Inexpensive Pipe Covering for Prevention of Sweating.

W. H. Tucker and J. H. Rushton; University of Virginia.

Data are presented on the effectiveness of various saw-dust paint mixtures as pipe covering. Sweating from humid air on cold iron pipes can be prevented by painting the pipes with a sawdust-paint or cork paint mixture. The method is simple, inexpensive, and useful where temperatures are not too low or humidities too high.

13. The Thermodynamic Properties of Air.

V. S. Williams; University of Virginia.

The thermodynamic properties of air at low and high temperatures (-180°C to 300°C) and for pressures to 220 atm have been calculated from the Joule-Thomson coefficient.

The data are given in the form of charts for H vs. T , S vs. T , H vs. S , C_p vs. T , T vs. T , P vs. H , H vs. P .

14. Automatic Roof Ventilator Tests.

E. M. Simons; Virginia Polytechnic Institute.

The ability of an automatic roof ventilator to exhaust vitiated air from a room or building depends primarily on the velocity of the wind across the ventilator head and the difference in temperature between the air in the room and the outdoor air.

The investigation under discussion is a study of the performance characteristics of various size ventilators of a given make under controlled temperature and wind velocity conditions. A special wind tunnel was constructed in the Mechanical Engineering Laboratory of the Virginia Polytechnic Institute for the purpose of running these tests.

15. Air-Drying of Colloidal Nitro-Cotton.

Fred W. Bull, A. F. Giacco and J. M. Mount; Virginia Polytechnic Institute.

One of the "bottlenecks" in the nitrocellulose industry has been the lengthy period required for the drying process. As yet, the drying theory for colloidal materials is somewhat indefinite. The greatest obstacle encountered in the drying of such materials is the formation of a relatively thick, horny, outer layer, or skin, which retards diffusion of the liquid through the mass to the surrounding medium. It has been the object of this investigation to obtain sufficient data to plot drying rate curves under various drying conditions. Test runs were made varying (1) the temperature of the drying surface from 70°F. to 90°F. ; (2) the thickness of the mass from 0.25 to 0.50 inch; and (3) the temperature of the constantly circulated drying medium, air, from 60°F. to 85°F. The four sides of the molded, colloided nitro-cotton specimen were carefully insulated and one side placed firmly against the heating surface to insure the drying process to take place from one surface only. A description of the apparatus used and procedure followed are included.

16. Factors Affecting Spray Drying.

W. C. Carnell and Albert H. Cooper; *Virginia Polytechnic Institute.*

Spray drying of solutions and suspensions has the advantages of (a) rapid rate of drying due to the tremendous surface area exposed to the drying action of the air, (b) a relatively low temperature at which the drying is accomplished, a particular advantage in the drying of heat sensitive colloidal material, as milk, which can be spray dried without affecting the colloidal structure, and (c) production of a finely powdered product, thereby eliminating subsequent pulversizing where a powdered product is desired.

Results are presented covering a study of the variable factors affecting spray drying, and an attempt has been made to correlate these factors with the resulting properties of the product, such as particle size, form, and moisture content. The factors studied include (a) physical and chemical nature of the solutions to be dried, (b) concentration of the solution, (c) drying surface, or size of sprayed droplets, (d) temperature of the solution, and (e) temperature and humidity of the air.

17. Explosive Shattering of Manganese Ore.

Fred W. Bull and E. R. Griffith; *Virginia Polytechnic Institute.*

One of the problems which is encountered in the recovery of manganese from manganese ore is the crushing of the ore preparatory to ore dressing. The conventional methods of crushing and grinding do not attain 100 per cent efficiency of crushing, but by explosive shattering of the ore, a closer approach to 100 percent efficiency is attained. This is made possible by the following factors: (1) instantaneous crushing due to the suddenness of the blow; (2) differential crushing due to the shattering of the more metallic minerals rather than the gangue minerals, and (3) the utilization of most of the energy in crushing due to the elimination of undesirable fines. The principle of explosive size reduction depends upon the fact that an expansible substance, such as steam, contained within the cracks or pores of the solid body will disrupt the body upon expansion. In order to obtain the most efficient combination of the factors influencing the operation, tests were made on pyrolusite varying (1) the pressure of the steam from 80 to 160 pounds per square inch, (2) the time of holding the pressure in the steam chamber in contact with the ore from 1 to 16 minutes, and (3) the time of soaking the ore preliminary to explosion from zero to a period of one month.

18. Silica-Gel as a Means of Studying Gas-Liquid Interfacial Area.

R. S. McDaniel, E. F. White, Jr. and J. H. Rushton; *University of Virginia.*

Data are given on rate of set of silica-gels and the method whereby the rate can be controlled. A method is described whereby a dynamic liquid surface in a packed column can be converted to a static surface of approximately the same area. The extension of these processes is outlined and data given to show how gas-liquid interfacial area may be determined directly by experiment.

19. The Effects of Misadjustment and Negligence in the Modern Automotive Engine.

Martin Stark and J. B. Jones; *Virginia Polytechnic Institute.*

Modern automotive engines suffer a great deal of neglect as a result of their operation by the average automobile owner. Neglecting some

parts of the engine has a rather great effect on both the economy and power output of the engine; but neglecting other points, even though these points are widely advertised as important ones, seems to have very little effect.

The serviceman's cure for such neglect is the motor tune-up, which automotive manufacturers recommend at specified intervals in their product's operation. Again, it is found that certain adjustments are critical for the operation of the engine at peak power and efficiency, while a much wider latitude is available in others before any appreciable effect can be noticed on the engine.

20. Lineal Thermal Expansion Coefficients of Materials at Low Temperatures by the Fizean Method.

W. G. Canham; *University of Virginia*.

In design of low temperature equipment the contraction during cooling is an important factor. Interferometric determinations of the coefficient,

$$B = \frac{1}{L} \left(\frac{dL}{dT} \right)$$

for several metals have been made at temperatures down to -180°C . in apparatus to be described.

21. The Theories of Failure of Wood in Flexure.

E. George Stern; *Virginia Polytechnic Institute*.

A theory of failure of wood in flexure, based on present information on the elastic and strength properties of wood, as compared with Galileo's and Navier's theories.

Considerations of the specific properties of wood, its characteristics under stress, and application of our knowledge in changing the non-homogeneous structural material to a more homogeneous one, permit a better utilization of the favorable strength-weight ratio of wood in the limit design by preventing early failure.

SATURDAY, MAY 9—9:00 A. M.

22. Industrial Waste Disposal Survey in Virginia.

Fred W. Bull, E. T. Darden and R. E. Sentz; *Virginia Polytechnic Institute*.

The Department of Chemical Engineering of the Virginia Polytechnic Institute has for several years been conducting surveys on the methods of disposing of industrial wastes in Virginia. Since the bulk of all industrial wastes are disposed of by dumping them into the rivers, and since this method of waste disposal is most likely to become objectionable or even hazardous to the public, it has been the object of the studies conducted at V. P. I.

In 1940 and 1941, a general state-wide survey was made in order to get a broad view of the stream-pollution-by-industrial-waste-disposal situation in Virginia. A thorough study of all previous work done on the subject was made. Conferences were held with all the officials of the various organizations and research groups who had made stream pollution studies in Virginia. Visits were made to the largest industrial plants of the State for the purpose of interviewing the officials of these plants and analyzing samples of the rivers, above and below these plants, to determine the extent of pollution. It was found that the greatest part of the pollution on the New, James, and Roanoke rivers was from paper, rayon, and tanning industries.

Since last September, the tanning industry has been the object of the studies at V. P. I. A thorough study has been made in order to determine accurately the effect on the New River of two particular plants on its banks. One, The Mead Corporation, is located at Radford; the other,

Leas-McVitty, is located at Bluff City near Pearisburg. By means of extensive chemical analysis of the effluents being thrown into the river, and of water samples taken at various points above and below the plants, efforts have been made to determine the effects of stream flow, temperature, and plant operation on the extent of pollution of the river.

23. Design of Calcium Chlorate Cell to Utilization of Solvay Process Waste.

Frank C. Vilbrandt and William C. Miller; *Virginia Polytechnic Institute.*

The purpose of this investigation was to find the optimum cell conditions for the electrolytic production of chlorates from Solvay wastes.

A recapitulation of Tober's beaker size investigation of a non-diaphragm calcium chlorate cell was first made. Under current concentration of 1, 2, 4, 8, and 16 ampere per liter and at 20°, 30°, 40° and 60° and 90°C., with pH varying between 5.0 and 7.0 and with chromate concentration of zero to 4 grams per liter, solutions of Solvay wastes were run for 48 to 72 hours with and without catalysts, using carbon anodes and iron cathodes. Then, varying concentrations of Solvay wastes were electrolyzed in a large capacity or development size unit. Results comparable to production of a weed-killer by other methods were obtained.

24. Application of Osmosis to the Recovery of Caustic Soda in the Rayon Industry.

Frank Keel and Albert H. Cooper; *Virginia Polytechnic Institute.*

Recovery of caustic soda is an important economic problem in the rayon industry. A general discussion of the application of dialysis to the separation and recovery of caustic soda from hemicellulose, and the results of a study made on the diffusion of caustic soda through membranes and the factors which affect the rate of transfer.

25. Design of Distribution Plate for Absorption Tower.

Fred W. Bull, J. K. Musick and W. W. Boisture; *Virginia Polytechnic Institute.*

Regardless of the type of packing used in an absorption tower, one of the most important problems encountered in the design and operation of such a tower, is the prevention of channeling of the liquid and gaseous components. Various types of distribution plates have been designed in an effort to correct this difficulty with only a few meeting with any degree of success.

In an effort to correct the inherent difficulties encountered in the operation of the coke-packed absorption tower in the Chemical Engineering Unit Operations Laboratory, a distribution plate was designed and test made to determine its value for the prevention of channeling of the gas and liquid mediums used. Test runs were made varying (1) the absorbing medium, water, from 60 to 110 gallons per hour, (2) the volume of gas from 2500 cu. ft. per min. to 5500 cu. ft. per min., (3) the Carbon Dioxide in the gas from 6.3 per cent to 12.5 per cent, and (4) the temperature of the gas entering the tower from 110°F. to 70°F. Means of sampling the gas (1) before entering the column, (2) below and above each distribution plate, and (3) the exit gas, were installed in the tower. A description of the distribution plate used together with its assembly in the tower is included.

26. Factors Involved in Conveyor Mixing of Heterogeneous Solids.

Frank C. Vilbrandt and Guido J. Coli; *Virginia Polytechnic Institute*.

The object of this investigation is to evaluate the factors of speed of rotation, feed-rate, feed-mix proportion, particle size, density and geometric shape as applicable to mixing of heterogeneous solids in a screw conveyor.

Factors were studied by using a water insoluble chart with a water soluble copper sulfate in a set of four-stand-high, eight-feet long units, with sampling stations at eight-foot intervals. Both solids were sized into 50, 20, 16, and 4 mesh. Samples were taken at 15 second intervals. Speeds of 35 to 144 r.p.m., feed-rates to 1 to 5 cubic feet per hour and at 50-50 to 90-10 feed proportions.

27. Utilization of Carbide Generator Wastes for Production of Arsenate Spray.

Frank C. Vilbrandt and Ralph H. Bogle; *Virginia Polytechnic Institute*.

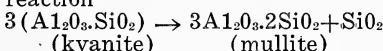
The purpose of this investigation was to produce an insecticide from a carbide generator waste pond. The calcium hydroxide residue waste resulting from the production of acetylene from calcium carbide and water was treated with arsenic acid and separation by sedimentation and filtration studied. Quality of calcium arsenate thus produced was studied for fineness, covering power, levity in dusting, and pH.

Processing the waste from the generators directly into calcium arsenate spray reduced the drying problems and resulted in an effective outlet for the waste in the vicinity of the waste, the apple growing region in which demand for such spray is quite high.

28. Dry-Pressed, Light-Weight Refractories from Virginia Kyanite.

A. W. Allen; *Virginia Polytechnic Institute.*

Kyanite, a member of the sillimanite group ($\text{Al}_2\text{O}_3\text{-SiO}_2$), has expansion properties which have somewhat hindered its use in dense refractories where porosity is not an attribute to service characteristics. A particular advantage of kyanite, however, is its rapid inversion at about cone (2534°F) where the reaction



occurs, giving, according to the alumina-silica phase diagram, about 87% mullite. Furthermore, the reaction is usually complete after one firing. The volume stability, low thermal expansion, and high melting point of mullite are well adapted to its use as a refractory.

The reaction above is accompanied by an expansion which produces a highly porous body, the amount of expansion depending on the grain size of the kyanite and presence of other materials in the body.

The paper will present very briefly a consideration of the mechanism of heat flow in a homogeneous body from Fourier's law and the partial differential equation for unsteady state heat flow as a guide to indicating the advantage of porous refractories in certain installations where low heat loss and low heat storage are advantageous. Other requirements of refractory insulators will be briefly considered as well.

The expansion of the kyanite which produces the low bulk density desired of a refractory insulating material causes disruption of the structure of the body unless the expansion is controlled properly. The development of strength in such a highly porous body is brought about by the incorporation in the body of small amounts of fluxing materials, which promote enough fusion on the surface of the calcined kyanite grains to give

the body its desired strength without loss of the required porosity.

The paper will include, then, expansion characteristics of kyanite-clay mixtures with relation to high porosity with maximum strength and the use of certain fluxes, among which is Virginia apatite, to promote strength of the fired product without hindering the insulating and refractory characteristics of the brick.

29. Simplified Method for the Approximation of Spanwise Air-load Distribution on Tapered Airplane Wings.

L. Z. Seltzer; *Virginia Polytechnic Institute.*

Most of the larger aircraft are built with wings whose planform are of the straight tapered variety. This type of wing has both aero-dynamic and structural advantages, besides being particularly suited to cantilever construction. The undesirable tip stall, resulting from the taper, can be corrected by incorporating twist in the outer wing panels.

In order to determine the shear, bending and torque loads, the spanwise lift distribution must first be determined. Until recently the Lotz method has been used for this determination. The Lotz method involves the use of Fourier coefficients and a method of successive approximations for obtaining them. Needless to say the method is a long and tedious one. It has been found that the exact lift distribution is very close to the distribution for a fictitious wing whose chord distribution is the arithmetic mean of the actual wing chord of a semi-ellipse of equal area. A very simple expression for the lift distribution, based on the assumption, can be written. From this relationship the additional section lift coefficients can be derived as a function of the taper ratio. The basic section lift coefficients due to geometric twist, are also derived from a similar assumption.

30. Protecting Domestic Hot Water Heating Coils with Sodium Hexametaphosphate.

P. H. McGauhey and F. C. Larson*; *Virginia Polytechnic Institute.*

Sodium hexametaphosphate is the sulfa drug of the water treatment field. Its effect in preventing the deposition of calcium from high bicarbonate waters, in the stabilization of lime-softened water, and in the prevention of corrosion has been little short of phenomenal.

In this paper the authors present the results of a preliminary study with a simple device for preventing the annual bursting of domestic hot water heating coils by applying hexametaphosphate.

The cold water supply line to a hot water tank was cut and an orifice plate inserted. Connections from either side of the orifice were made to a cylinder containing hexametaphosphate glass by means of copper tubing. Needle valves in the connecting tubes made it possible to vary the proportion of flow through the chemical cylinder. The cylinder was packed with chemical to obtain a minimum of void space throughout the period of operation. With this device all water flowing into the hot water tank was automatically treated with about 2 ppm of hexametaphosphate.

The heating coils in a furnace equipped with this device showed no signs of scale at the end of one season's operation on water containing about 240 ppm of bicarbonate alkalinity as CaCO_3 .

Due to the loss of personnel it was not possible to keep a check on the reversion of the metaphosphate to orthophosphate in the cylinder. The satisfactory operation of the apparatus, as evidenced by the condition of the heating coil, indicates that this was not serious. The extent to which the metal cylinder was attacked by the strong solution was not appreciable, and the authors conclude that it is practical to treat small quantities of water with sodium hexametaphosphate.

The authors now propose to make a careful study of the performance of their device, possibly adapting it to the less soluble forms of the chemical.

*Graduate student in sanitary engineering.

MINUTES OF THE SECTION OF FORESTRY

J. H. JOHNSON, *Chairman*

GEORGE DEAN, *Secretary*

FRIDAY, MAY 8—10:00 A. M.

1. Virginia's Forest Fight for Democracy.

F. C. Pederson; *State Forester*. (Read by George W. Dean.)

Virginia's forests are fighting for democracy. They are supplying materials for almost every type of war implement requiring wood, as well as housing facilities for active personnel and defense workers.

In Germany forest products are classed as the second most important resource. Inasmuch as forest products are invaluable to our enemies they are by the same token absolutely necessary to our allies. In fulfilling our obligations under the terms of the Lend Lease act, the materials must be delivered to their destination. This requires containers, crating and ships, all of which require tremendous quantities of wood.

It will be readily perceived that the forests of Virginia and the south along with the timber resources in other sections of the Country are store-houses of wealth, vitally important for the successful prosecution of the war. The perpetuation of these forests is accordingly a vital issue. These forests must be protected from both fire and destructive overcutting.

The protection of Virginia's forests from fires must be an immediate and major concern to all the people in the State. During the calendar year 1941, there were recorded in Virginia, 3967 forest fires which burned over approximately 112,000 acres. The people of Virginia should rise up and demand the two things that will eternally reduce forest fire losses. These are (1) complete preparedness, (2) more severe punishment for those haled into court for violations of the excellent forest fire laws which have been enacted in Virginia. The problem is not only a fire hunt but also a man hunt. Not the fire, but the hand that lights it is the public enemy. Forest fires will continue to despoil and destroy until the officers of the law and the judge on the bench, the editor, the legislator, and the man on the street recognizes that the hand that starts the fire has committed a crime against society.

2. An Analysis of Recent Virginia Legislation for State Regulation of Methods of Cutting on Private Forests and of Recent Proposals for Federal Legislation.

Chapin Jones; *University of Virginia*.

There was passed in 1940 and amended in 1942 the only Virginia statute which regulates the methods by which a forest land owner may cut his own forest. This "seed-tree law" applies only on land on which *Pinus taeda* or *Pinus echinata*, together or singly, represent fifty percent or more of the trees present. This law provides that when such lands are cut for commercial purposes there shall be left uncut not less than four "seed-trees" per acre of *Pinus taeda* or *Pinus echinata* twelve inches or more in diameter. Numerous exceptions and provisos limit the applicability of the statute.

Each of the last five annual reports of the Acting Chief of the U. S. Forest Service has advocated "public regulation" of methods of cutting private forests.

There have recently been introduced into Congress three bills intended to bring about "public regulation." One provides that "regulation" be carried out wholly by the federal government. The other two provide that the various States be given an opportunity to administer such regulation, with federal cooperation but subject to federal approval, but in the case of any State's failure to act with federal approval the Secretary of Agriculture may administer such regulation and is authorized by the terms of one bill and required by the terms of another bill to withdraw existing co-operation in many conservational activities.

3. Farm Forestry in Virginia.

Wilbur O'Byrne; *Extension Forester.*

Farm forestry differs from the art as practiced on industrial and public forests, in that it has to do with relatively small areas making up integral parts of operating farms, and must be carried on by a farmer as a sideline to the business of farming, rather than by a forester as a sole responsibility.

The first duty of the farm forest is to supply the wood requirements of the farm, with sales limited to surpluses over and above those requirements. Being a sideline to farming, farm forestry must be correlated with the material requirements and labor supply on individual farms, and must cater to local rather than general markets.

Forest products can be produced more economically in farm forests than under other forms of ownership. The soil will average higher in fertility; proximity of the owner insures protection against fire and trespass that must be provided by specific organizations on larger and more remote properties; small size and proximity make it possible for the owner to give his personal attention, utilize slack season time of farm labor, work stock and equipment and salvage low grade material that can not be handled economically on large forests.

All forestry in Virginia has suffered from the abundance of usable products and the ease with which useful species reproduce themselves—it has been assumed that no effort was necessary. Farm forestry has suffered further from tradition—that forest land was "waste land" that must be cleared as a prerequisite to use. Improved markets of recent years, especially the war demand, are changing this attitude, and while awakening to the possibilities of forestry has not been as rapid as it has been with some of the pump and paper companies, farm forestry in Virginia is moving ahead.

4. Observation on the Current Fire Season in Southwest Virginia.

A. Cochran; *Supervisor of Jefferson National Forest.*

A democracy can flourish only when its roots are nourished in fertile soil. Our people need all the natural resources. The destruction of the forests this spring by fire, always carelessly if not maliciously caused, cannot be other than disturbing to thinking, responsible people.

The agents for preventing forest fires are law enforcement, education, and social pressure. Brush burning fires which caused a large part of the destruction this spring will cease when these cases are properly prosecuted and worthwhile penalties are attached. The same is true of incendiary fires which seem to be on the increase. Minimum fines and suspensions are demoralizing and breed disrespect for the law. There is no uniformity as to what is adequate evidence among the counties. Smokers cause about one-third of the fires in the State. Turning this destructive habit into a constructive one is the subject of a study proposed by the Advisory Council on Human Relations organized by the American Associa-

tion for the Advancement of Science. Forest fires are more than 20 per cent caused by local residents—people living within a mile or a few miles of the forest. The educational devices of modern times must be directed toward reaching these people if the fire problem is to be solved.

5. Work of the George Washington National Forest, Illustrated by a Technicolor Motion Picture.

M. C. Howard; *Supervisor of the George Washington National Forest.*

A colored motion picture illustrating the activities carried on by the United States Forest Service in the George Washington National Forest was shown.

6. Educational Work of a Forest Industrial Company.

J. H. Johnson, *Chesapeake Corporation, West Point, Virginia.*

Following the presentation of the papers and discussions, Chairman Johnson declared the meeting open for the transaction of business.

Upon a motion by Wilbur O'Byrne and seconded by M. C. Howard and by unanimous approval, J. H. Johnson and George W. Dean were reelected as Chairman and Secretary respectively. Upon a motion by Dean and a second by Cochran and unanimous approval, Chapin Jones was elected the Forestry Section representative on the Journal's Editorial Board.

Chairman Johnson requested about a one-half typewritten page abstract of each paper presented.

Upon the motion of M. C. Howard and the unanimous approval of the Section, a resolution was prepared to Governor Darden commending him for his current interest in the forest fire situation and assuring him of support of any steps which he may take to improve the situation.

Upon a motion of R. I. Sorensen, the meeting adjourned at approximately 5:30 P. M.

GEORGE W. DEAN,
Secretary, Forestry Section.

MINUTES OF THE
SECTION OF GEOLOGY

RAYMOND S. EDMUNDSON, *Chairman*

ROY J. HOLDEN, *Vice-President*

WM. M. MCGILL, *Secretary*

FRIDAY, MAY 8—9:30 A. M.

The Section of Geology met in Parlor 318 of the Hotel Roanoke on Friday, May 8, 1942. Two sessions were held; the first from 9:30 A. M. to 12:40 P. M., and the second from about 2:10 to 4:30 P. M. Dr. Raymond S. Edmundson, Chairman, presided at both sessions. An attendance of thirty people was recorded for the meetings, which was considered very good in view of existing conditions. As in previous meetings, discussions of each paper stimulated interest in the program. The following papers were presented:

1. **Ground-Water Work of the Virginia Geological Survey.***

William M. McGill; *Virginia Geological Survey.*

(Presented by title.)

A brief account of the increased demands from various localities, areas, and organizations throughout Virginia for additional supplies of water, particularly from ground-water sources; the importance of continuous detailed investigations of ground-water conditions throughout the State; and the type and scope of investigations being made and the services rendered by the State Geological Survey, and by the Ground Water Division of the U. S. Geological Survey in cooperation with the State Survey.

The primary objectives of the ground-water investigations are to obtain and disseminate accurate, helpful information and promote the intelligent development, effective and efficient utilization and proper protection or conservation of the State's ground-water resources.

2. **History of the Development of Geology of the James River Basin, Virginia.**

Joseph K. Roberts; *University of Virginia.*

The geology of the James River drainage basin of approximately ten thousand square miles is extremely complex. The earliest observations began about 1781, which led to the first real progress from 1835 to 1841. James River rises in the higher Appalachians, and flows across the Great Valley, Blue Ridge, Piedmont and Coastal Plain provinces. Each of these divisions or physiographic provinces presents more or less its own geology. Many students have contributed to our knowledge of the geology of the James River basin. Some of the older investigations were made by Timothy A. Conrad, William B., and Henry D. Rogers, John L. and Henry D. Campbell, William M. Fontaine, and Thomas L. Watson. The work of these investigators forms the basis of modern studies in furnishing a stimulus to extend or expand knowledge.

The first studies were made along the line of altitudes, the natural divisions of the State, fossil remains, useful minerals, and certain natural features. Modern methods of study were begun about 1910, and have

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to the present time included all modern methods, the latest one being geo-physical investigations on the Coastal Plain and its basement complex. The Piedmont probably holds the most difficult of problems in the James River basin due to intense metamorphism and erosion. The youngest portion of the basin geologically is the Coastal Plain, followed in order by the Triassic basins of the Piedmont, the Appalachians, the Great Valley, and finally the Blue Ridge and Piedmont.

3. Notes on the Athens Fauna.

Alfred G. Fischer; *Virginia Polytechnic Institute.*

(Introduced by Roy J. Holden.)

Recent investigations of the Athens fauna of the Roanoke syncline have revealed new forms, and specimens showing undescribed morphologic features. Among these are synrhabdosomes of *Climacograptus scharenbergi*, *Raphiophorus powelli* with genal spines, new species of *Dionide*, a *Telephus* complete with thorax of nine segments, and problematica.

4. Weathering of Spessartite.

Roy J. Holden; *Virginia Polytechnic Institute.*

In Grayson County, Virginia, there is a large and persistent vein which carries chiefly spessartite. Wherever the writer has found spessartite in the weathered zone it has been more or less altered to the hydrated oxide of manganese. Since this vein deposit seems to have come from deep sources and possibly formed at elevated temperatures, the possibility of magmatic carbonation is suggested. A test on fresh spessartite with carbon dioxide at 600 pounds pressure, with a temperature of 300 degrees C. for a week gave negative results. Therefore atmospheric carbonation is indicated. The end products of the weathering are hydrous manganese oxide, clay and quartz. Manganese carbonate has not been found. It was probably formed but, being unstable under oxidizing conditions, was immediately broken down to the hydrous oxide. This is a specific example of the general case of the carbonation of the primary silicates with the production of a lower hydrous silicate, a carbonate of the base and silica. In this case no lower hydrous silicate of the manganese has been found, indicating the complete carbonation of the manganese. If the clay is kaolinitic, then there was formed a lower hydrous silicate of the alumni. If the clay is bauxitic, then the alumina was carbonated.

5. A Profile Study of Three Soils Developed from Material Weathered from Limestone.

S. S. Obenshain and C. G. Morgan; *Virginia Agricultural Experiment Station, Virginia Polytechnic Institute, Blacksburg, Va.* (Presented by S. S. Obenshain.)

The genetical and morphological characteristics of Hagerstown silt loam, Pisgah silt loam and Clarksville cherty silt loam, three southwest Virginia soils which were formed from material weathered from limestone, were studied by means of mechanical and chemical analyses, and field studies of the soil profiles. The soils used in this investigation are all related in a general way, that is, they all occur within the Gray-Brown Podzolic region and are all derivatives of relatively high carbonate rocks. Samples of all three soils were taken in Russell County, Virginia, within the same vicinity. Therefore, the variations in the physical and chemical composition are due to variations in parent rock and relief and not to variations in climate. Chemical analyses of the parent rock showed that the Hagerstown silt loam and Clarksville cherty silt loam were formed from material weathered from a dolomitic limestone, and that the Pisgah silt loam was formed from material weathered from a high grade limestone. Complete chemical analyses of the various horizons of the soil profiles showed that the soil forming processes of the three soils studied were podzolic in

nature. The parent materials or C horizons of all the soil profiles studied were clays. Hagerstown, which contained approximately 38 percent clay in the A₁ horizon and 75 percent clay in the C horizon, was the heaviest of the three soils studied. Laboratory and field classifications of soil class conflicted in the case of the Hagerstown profile. The ratios of silica of alumina, and silica of iron showed clearly the accumulation of alumina or iron in the lower horizons. The alumina ratio showed the thoroughness of the weathering of the three soil profiles. Calculations of the percentage of bases lost during the soil forming processes showed that calcium was lost from the soil to a greater extent than the magnesium.

6. Fold Structures in the Pre-Cambrian Complex of the Blue Ridge in Carroll and Grayson Counties, Virginia.

Alfred C. Hawkins; *Soil Conservation Service, Winchester, Va.* (Introduced by Wm. M. McGill|)

On the Blue Ridge mountain front for a number of miles northeast of Fancy Gap in Carroll County, adjacent to the Blue Ridge Parkway, the folding in the Wissahickon schist and gneiss is in the form of pitching anticlines and synclines, whose limbs are very highly inclined to the horizontal, and whose axes are in general at right angles to the mountain front, and to the overthrust which marks its base.

At Elk Creek in Grayson County (along U. S. Route 21 north of Independence, Virginia) the country rock is for the most part a granite gneiss carrying a minor number of small granitic intrusions. This gneiss has been involved in folding, between the granite stock which forms Point Lookout Mountain and the Paleozoic series just north of Elk Creek valley. This folding is intricate and intense and its axes trend north-south, being marked by long narrow ridges underlain by rocks with steep dips, with numerous characteristic prongs and hooks, all turned toward the west.

In both of the above cases the folds are clearly outlined by topography, distribution of soils, and influence on drainage lines, roads and other cultural features.

7. Minor Tensional Structures Associated with Appalachian Folds.

Edward C. H. Lammers; *Washington and Lee University.*

When limestones are folded, tensional stresses produce open fractures which may be subsequently sealed by calcite veins. If studied carefully, these veins furnish a great deal of information as to the competence of the limestone strata at the time of deformation.

Thick veins along the bedding planes near the axes of closed folds indicate a high degree of competency. Complex vein patterns, brecciation, within the trough of a closed syncline or beneath the arch of a closed anticline indicate incompetence characterized by extreme brittleness.

En-echelon gash veins in belts that parallel the strike of the folds and converge beneath the axes of broad open anticlines may be interpreted as the result of fatigue, brought on by the weight of the superincumbent beds, if the individual gash veins converge upward. If, on the other hand, the individual gash veins converge downward, they indicate a thickening of the strata beneath an unusually competent layer, which by supporting the weight of the overlying beds has relieved the gravitational stress normally exerted on the strata beneath it.

On the limbs of closed folds thin limestones interbedded with thick shales in most places exhibit closely spaced strike veins which are nearly perpendicular to the bedding. Since these veins separate the limestone layers into unit blocks, they are interpreted as the result of elongation in a rock too brittle to be thinned by flow or shear.

8. A Late Pre-Cambrian Landmass in Eastern North America.*
William R. Brown; *Cornell University*. (Presented by R. O. Bloomer.)

A study of pre-Cambrian metasediments in the vicinity of Lynchburg, Virginia, has led to the conclusion that the rocks which now form the core of the Blue Ridge anticlinorium were a part of a late pre-Cambrian landmass, the east front of which stood at an unknown and varying distance east of the present site of the Blue Ridge. Evidence for this is based chiefly upon the great erosional interval at the base of the Lynchburg gneiss and the fact that late pre-Cambrian sediments were derived, at least in part, from the west.

Hypotheses relating to this landmass are drawn as follows: (1) Sediments from this land area were carried eastward into a geosyncline and were incorporated in part into the Lynchburg and Wissahickon formations. By the end of Lynchburg time the land area had been covered wholly or in part by progressive overlap. (2) The Lynchburg and Wissahickon formations are of near equivalent age; the former being a near shore, the latter a deeper water product of the same general period of sedimentation. (3) The Paleozoic landmass of Appalachia was not in existence in late pre-Cambrian time but was formed near the end of the pre-Cambrian by the orogenic deformation of this geosyncline.

The suggestion is made that a knowledge of the direction of sedimentation might be useful in determining the Paleozoic or pre-Cambrian age of various Piedmont sediments. Derivation of sediments from the west would suggest a pre-Cambrian age.

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9. Mining Under the Priorities System.

Marcellus H. Stow; *Assistant Administrator, Mining Branch, War Production Board, Washington, D. C.*

The Priorities System directs strategic and critical materials away from non-essential production to production essential for the war effort. It organizes, mobilizes, and directs materials and productive facilities where they will be most useful to the direct military program and to the indirect phases of the war effort, upon which the military program is dependent. The central fact in the whole situation is that there are not enough materials to go around. It has been recognized clearly that mining is fundamentally the Number One War Industry. Preference Rating Order P-56 was established in September 1941, largely through the efforts of Wilbur A. Nelson, Administrator of the Mining Branch, War Production Board. The purpose of the order is to facilitate the acquisition of machinery, equipment, and supplies by mine operators producing mineral raw materials essential to the War Program. High priorities are available for mine operators producing critical and strategic minerals; by this means they can obtain repair parts and new machinery to enable them to maintain and increase production.

10. Industrial Mineral Problems of Virginia.

John T. McCormick and Charles E. Sears, Jr.; *Virginia Polytechnic Institute*. (Presented by John T. McCormick.) (Introduced by Roy J. Holden.)

Virginia Polytechnic Institute is well equipped to do research and testing in ore dressing on the low-grade mineral deposits of the State with the sum of developing processes which will produce marketable material. We have been working on the manganese ores of the State with success and have much of this work yet ahead of us. We have also been concerned with iron, lead and zinc, tin and coal preparation.

We request co-operation from the geologists of the State and the mine operators in bringing such problems to our attention and desire to be of real service to the State in developing processes to handle its mineral resources.

11. Dolomite in Virginia.

Arthur Bevan; *Virginia Geological Survey*.

The Cambrian and Lower Ordovician rocks in the Valley and Ridge (Appalachian Valley) province in Virginia contain four thick, extensive formations which are essentially high-magnesian limestones and dolomites. They are the Shady-Tomstown dolomite, the Honaker and Elbrook dolomites, the Copper Ridge dolomite and the Beekmantown dolomite. These dolomites occur in characteristic elongate northeast-southwest belts along the flanks and in the middle portions of numerous anticlines throughout the length of the Valley.

The Shady-Tomstown dolomite occupies a single belt along the west base of the Blue Ridge. The dolomite beds are crystalline and 1000-2000 feet thick. The content of magnesia is high, as much as 21.7 per cent in some places. The Honaker dolomite occurs in seven belts. It is crystalline and about 1200 feet thick. Some beds are calciferous, but many are highly magnesian. The Copper Ridge dolomite is a somewhat coarse-grained, high-grade dolomite, about 1200-1400 feet thick. The Beekmantown dolomite crops out in each county in the Valley. Most of the dolomite beds are in the southwestern half of the Valley. It is calciferous to the northeast and generally contains chert. The dolomite beds are about 700-1200 feet thick.

Dolomite is of increasing current interest and importance because of its use, especially by the Pidgeon ferro-silicon process, for the manufacture of magnesium metal, much needed in the total war offensive. Virginia dolomites are suitable for this purpose.

12. Relations and Age of the Catoctin Formation in Central Virginia.*

R. O. Bloomer; *University of Virginia*.

Detailed studies in the Blue Ridge in the Buena Vista quadrangle near Lexington, Virginia, have shown a striking similarity in the lithology of the Catoctin and Unicoi formations. It is believed that the metabasalt at the top of the Catoctin and the basalt flow at the base of the Unicoi formation in this area are genetically related. Volcanic tuff and arkosic sandstone and conglomerate in the two formations are petrographically alike.

The Catoctin and Unicoi formations each overlie pre-Cambrian granodiorite and are locally characterized by basal conglomerate composed of granodiorite boulders. The contact of the Unicoi and Catoctin formations is, throughout the area, marked by overthrust faults. These relations lead to the conclusion that the Catoctin formation in the Buena Vista quadrangle was deposited east of its present locality.

The absence of the Catoctin formation beneath the Unicoi formation in the Buena Vista quadrangle, the lithologic similarity of the two formations, and the presence in both of extrusions of identically peculiar basaltic composition lead to the tentative conclusion that the Unicoi formation stratigraphically overlies the Catoctin formation by a continental overlap. Consequently the Catoctin is thought to be an early Cambrian formation separated from the Unicoi by a minor unconformity.

This paper was read by title at the Boston meeting of the Geological Society of America, December, 1941. Published by permission of the State Geologist of Virginia.

13. A Review of the Literature on Granodiorite in Virginia.

Arthur A. Pegau; *University of Virginia*.

This rock type, referred to as syenite, granite, and granodiorite, is a very complex one. At least three distinct theories have been advanced to account for this. The first one was published in 1916 by the late Dr. Watson; the second was put forward by Miss Jonas in 1935; the third by Mr. and Mrs. Stose in 1939.

1. Watson wrote as follows: "These rock types exhibit certain relationships that mark them as differentiates from a common magma."

2. Miss Jonas wrote: "It is evident that the granodiorite has been subjected to a series of hydrothermal changes since consolidation."

3. The last theory is as follows: The granitic magma intimately permeated the older rocks parallel to their foliation and formed mixed rocks which have been called injection gneiss or migmatite.

The three theories are: 1. Magmatic differentiation; 2. Hydrothermal alteration; 3. Migmatitization.

14. A Limestone Cobble on the Blue Ridge, East of Irish Creek, Virginia.

Edward Steidtmann; *Virginia Military Institute*.

Transported fragments of chert and of a variety of limestones, dolomite, and sandstones were found on the granodiorite of Boston Mountain about 1000 feet above the level of Irish Creek. Fourteen specimens were described. The sandstones have waterworn surfaces. The carbonate rocks do not. Some of the sandstones resemble Blue Ridge types. Others are like certain ferruginous phases of the Clinton formation, about 20 miles to the west. The carbonate rocks are from several different formations. One, a bryozoan and crinoidal limestone was carried at least 15 miles.

The possibility of the carbonate rocks having been carried here by people was studied but dismissed. Points against it include the variety of carbonate rocks, indicating their having been brought from rather widely separated sources, some at least 15 miles away; the impracticability and uselessness of bringing them; their scattered occurrence; and the definite recollections of a well qualified old resident of the area.

The cobble rests at an elevation which coincides with that of the Intermediate Peneplane of Stose and Miser. It was placed by a stream which flowed across the structures of the region before Irish Creek was born. It endured the time span in which Irish Creek lowered its channel by more than a thousand feet. This occurrence suggests the possibility of other high-level cobbles having survived in this area.

15. The Occurrence of Rhodonite in Piedmont Virginia.

William C. Overstreet; *University of Virginia*.

Psilomelane and pyrolusite have been reported frequently in the weathered rocks of Piedmont Virginia. But their sources—manganese silicates and carbonates, have received scant mention. In a manganese operation five miles northeast of Ferncliff, Louisa County, Virginia, rhodonite and rhodochrosite can be seen altered to manganese oxides. Rhodonite and rhodochrosite occur in a partially mesothermally altered quartzite bed of the Wissahickon formation. Other minerals present indicative of mesothermal action are epidote, specularite, and martite. Later supergene waters have partially altered the manganese silicate and carbonate to psilomelane, pyrolusite, and the rare manganese oxide, managanosite.

16. An Unreported Rock Type from the Burkeville-Crewe Area, Virginia.

John E. Husted; *University of Virginia*.

An unusual rock type is found in a belt $1\frac{3}{4}$ miles long and 30 to 40

feet wide southeast of Burkeville, Virginia. This rock is tentatively identified as a silicified fault-gouge because of the fragmental character of boulders along the outcrop, included lithic fragments of country rock, and the presence of a cherty matrix.

17. Limestone Mining in Northern Virginia.

Charles E. Bass; *M. J. Grove Lime Company, Stephens City, Va.* (Introduced by Wm. M. McGill.)

Enormous quantities of lime and limestone are employed in modern metallurgy, particularly for fluxing in both Open Hearth and Blast furnaces. Because of the impurities in the iron ore it is very important that impurities in the fluxing stone be kept to a minimum. In some cases stone impurities can be wholly overcome only by selective mining of certain high grade beds.

The largest limestone mine in northern Virginia was opened in 1939 by the M. J. Grove Lime Company at its Stephens City plant. At this site quarry operations for high-calcium limestones were started in 1899 and have continued since that time. The original quarry was started on the apex of a local anticline where the Mosheim limestone was well exposed over a considerable area. This bed has a local thickness of 120 feet. After many years much of the available Mosheim was quarried, leaving on its flanks 55 feet of overburden (Lenoir formation) to be removed as waste.

The original mine tunnel incline was driven down the hanging wall of the west flank of the anticline which dips 32°. This angle allowed the contact between the Mosheim and Lenoir formations to form a roof free from dangerous hanging stones. This incline took a cut 55 feet high and 55 feet wide advancing downward 75 feet where the first level was started 60 feet wide and 55 feet on the high side. From this level rooms were driven north and south and at regular intervals of 100 feet windows were driven to the outside at the same elevation as the first level. This method leaves pillars approximately 75 feet by 100 feet and gives a working face where windows hole to the outside of about 90 feet. This same type of mining extends to the second and third levels except that these levels are planned for rooms 75 feet wide, 55 feet high on the high side and pillars 60 feet by 60 feet. The footwall of the Mosheim formation is encountered by windows driven from the second level which gives maximum working face in windows of 120 feet.

18. Geology of the Southwestern Part of Walker Mountain in Smyth and Washington Counties, Virginia.*

Raymond S. Edmundson; *Virginia Geological Survey.*

Walker Mountain in Southwestern Virginia is the remnant northwest limb of a syncline which is progressively overridden by a thrust sheet towards its southwestern end. About 6 miles northeast of Abingdon, Washington County, the structure is concealed by Honaker dolomite thrust from the southeast (Seven Springs Fault.) West of Walker Mountain, in Rich Valley, the structure is bounded by the Saltville fault. A complete section of the Walker Mountain fault-block includes Cambrian to Upper Devonian strata dipping steeply to the southeast. Farther southwest in Tennessee, along the same general strike of Walker Mountain, both limbs of the syncline are present in Bays Mountain. These emerge from beneath the thrust or in some places offset the trace of this fault. Resistant Silurian sandstones (Clinch and Clinton) thin gradually toward the southwestern end of the structure and are absent along the belt characterized by cross faulting. The absence of these rocks may have contributed to a weakened zone which failed by cross faulting during the deformation.

*This paper was read by title at the Boston meeting of the Geological Society of America, December, 1941. Published by permission of the State Geologist of Virginia.

19. Geological Field Trip in the Roanoke-Salem Area, Virginia.

Roy J. Holden; *Virginia Polytechnic Institute.*

A summary outline of the route, topographic, scenic, and geologic features and "high points" of the field trip in the Roanoke-Vinton-Carvin's Cove-Salem-Catawba Mountain area scheduled for Saturday, May 9th. A sketch map of the route, topographic maps of the area covered, and a mimeographed outline of the salient features of the trip, not only added to the presentation of the talk but proved of value to the members and guests of the Section who planned to go on the trip and to others interested in the geology of the Roanoke-Salem area.

BUSINESS MEETING

Upon completion of the last paper a brief business session was held during which matters of interest to the Academy and the Section were discussed. Upon recommendation of the nominating committee the following officers were elected for the next year: Dr. Roy J. Holden, Chairman, Dr. Sam S. Obenshain, Vice-Chairman, and Dr. Robert O. Bloomer, Secretary. Dr. E. C. H. Lammers was re-elected as the representative of the Section on the Editorial Board of the VIRGINIA JOURNAL OF SCIENCE. The meeting was adjourned at 4:45 P. M.

SATURDAY, MAY 9—8:30 A. M.

On Saturday morning, May 9, about 24 members and guests of the Section assembled in front of the Hotel Roanoke and left at 8:30 A. M. in automobiles for a geological field trip in the Roanoke-Salem-Catawba Mountain area under the leadership of Dr. Roy J. Holden, assisted by R. S. Edmundson and W. M. McGill. A State Police escort was furnished through the cooperation of Col. M. S. Battle, Director, Division of State Police and Safety. Despite the limitations imposed by the prevailing rubber and gasoline restrictions, the attendance was considered very good. The route of the trip was from the Hotel Roanoke, via Jefferson Street, Gilmer, Commonwealth, and Hart Avenues and U. S. Route 460 to Bonsacks; thence northwest via State Route 114 along Cook Creek, through the gap in Read-Coyners Mountain to Cloverdale; thence southwest via U. S. Route 11 to vicinity of Hollins School; thence northwest on road up Carvin's Creek to Roanoke Reservoir; along Carvin's Cove — Carvin's Creek road around the northwest slope of Brushy Mountain; on Forest Service road up Brushy Mountain, along the top of Green Ridge and down Smith Ridge to Hanging Rock; Hanging Rock into Salem and return to Mason Creek—Catawba Highway (State Route 311); up Mason Creek to Mason Cove, across Catawba Mountain into Catawba Valley. A mimeographed outline of the trip and remarks by the leader on exposures examined and features visited or seen added to the interest and value

of the trip. Several stops were made to examine outcrops, study the scenery, topography, structural, and geological features and collect fossils. A picnic luncheon was enjoyed at a shady picnic ground near Hanging Rock. The trip ended in Catawba Valley about four miles northwest of Catawba Sanatorium, about 4:00 P. M.

WILLIAM M. MCGILL,

Secretary.

MINUTES OF THE
SECTION OF MEDICAL SCIENCES

J. E. KINDRED, *Chairman*

GUY W. HORSLEY, *Secretary*

FRIDAY, MAY 8—2:00 P. M.

1. A Simplified Method for the Determination of Free and Ester Cholesterol in Blood.

H. Gershberg (by invitation) and J. C. Forbes; *Medical College of Virginia*.

A comparatively simple procedure for the determination of total and free cholesterol in whole blood plasma or serum was described.

2. Urinary Chemiluminescence in Alcaptonuria, Hereditary and Experimental.

Lynn D. F. Abbott, Jr. and C. Lester Salmon, Jr. (by invitation; *Medical College of Virginia*).

It has been found that alcaptonuric urines when made alkaline and shaken vigorously with air will give off light. The luminescence of two different alcaptonuric urines as well as solutions of the homogentisic acid and lead homogentisate isolated from these urines was described. The rarity of alcaptonuria and the unavailability of homogentisic acid made it desirable to know if homogentisic acid in amounts sufficient to give luminescence would be formed and excreted by animals on a high tyrosine diet. Experiments with scorbutic guinea pigs and with rats was discussed. Strongly luminescent urines can often be obtained in several days with rats on a 12% tyrosine diet. In some cases luminescence can still be obtained with 1:25 dilutions of the urine. The *in vitro* inhibition of luminescence by excess ascorbic acid was discussed.

3. The Cellular Structure of the Cortex in the Marsupial Brain.

Walther Riese; *Medical College of Virginia*.

In the opossum, a very primitive member of the Polyprotodontia, the cells of the paleocortex and those of the archicortex are very highly differentiated, whereas those of the neocortex are in general poorly differentiated. The cellular structure of the cortex of the kangaroo, a highly specialized member of the Diprotodontia has been examined. In this species the cells of both the cortical areas considered as primitive and those of the more recent areas possess exclusively highly evolved cellular elements. Thus, from a cytological point of view, a sharp line of demarcation separates these two species, belonging however to the same mammalian order, and this is in conformity with the general organization of the two divisions of this order. Three different types of specialized nerve cells are to be found in the neocortex of higher mammals: pyramidal cells, granular cells and spindle cells, each of them being the principal constituent element of one of the cortical layers. However, in some areas, one or another of these types is predominant in all of the cortical layers so that three regional variations of cellular structure may be distinguished (namely, pyramidalization, granulation, and spindlization). The neocortex of the kangaroo shows all the regional variations of cellular structure occurring in the highest mammalian (human) brain, although these variations are less marked in the motor area and the visual field than in areas related probably to the sense of smell.

4. A Quantitative Study of the Bone Marrow of the Albino Rat.

James E. Kindred; *University of Virginia.*

The volume of the bone marrow of the bones of the skull, ribs, and sternum, vertebrae, long bones, and innominate bones was calculated from measurements on fresh bones and sections. Counts of numbers of cells per unit volume, differential counts and counts of cells in mitosis were then made from sample sections of these bones in eight rats of about 200 grams of body weight. From these data and mitosis cycles of one hour and of thirty minutes, respectively, and a growth rate of 0.026% per hour, the probable production of red blood corpuscles and granulocytes per hour per 100 grams of body weight were calculated. These data are to be related to the needs of the blood for corpuscles and to the production of blood corpuscles by the other hemopoietic organs.

5. Anatomic Changes in the Bovine Uterus During Pregnancy.

Ray D. Hatch; *Assistant Professor of Biology, Virginia Polytechnic Institute.*

Forty specimens of bovine uteri at various stages of gestation were studied. Observations of the many caruncular and intercaruncular sections were made in an attempt to clarify some of the controversial points regarding the anatomy and histology of the uterus during pregnancy. The following conclusions were drawn:

1. At all times during gestation there is some intercaruncular epithelium on the uterus.
2. Various stages of epithelial destruction may be seen at any time during the periods of gestation studied.
3. The maternal epithelium of the caruncle is complete at all times during gestation.
4. The placentomaternal relationship in the caruncular areas is epitheliochorial.

6. Behavior of Serum Proteins and Blood Volume after Infusions of Plasma and Saline.

Edwin W. Shearburn; *University of Virginia.*

This was a report on the serum proteins and hypoproteinemia animals. The best results were obtained through multiple small plasma transfusions.

7. Exposure of Animals to Low Barometric Pressures.

S. W. Britton and R. F. Kline; *University of Virginia Medical School.*

New-born and young animals are able to withstand exposure to low barometric pressures much better than adults. Rats, cats, dogs, and opossums were tested at 320 mm. Hg. (equiv., 22,000 ft. alt.)

Birds and bats survive for very long periods under similar hypoxic conditions.

Female animals (rats) withstand low oxygen tensions for much longer periods than males. This sex difference held for low pressure chamber temperatures between 16° and 38° C. There was a tendency towards approximation of the survival curves of the two sexes at the higher temperature levels.

BUSINESS SESSION

Dr. J. E. Kindred, Chairman, appointed a nominating committee at the beginning of the meeting. This committee submitted the following names: Dr. Harvey E. Jordan, Chairman, and Dr. Harvey B. Haag, Secretary. Dr. C. C. Spiedel was appointed representative on the VIRGINIA JOURNAL OF SCIENCE. It was recommended that the papers from the different sections be sent to a central committee and from there be allocated to the proper sections so that the papers would be presented in the section for which they are better suited.

GUY W. HORSLEY, *Secretary.*

MINUTES OF THE SECTION OF PSYCHOLOGY

W. M. HINTON, *Chairman*
EVELYN RASKIN, *Secretary*

FRIDAY, MAY 8—9:30 A. M.

The Section of Psychology met in Parlor 317 of the Hotel Roanoke, on Friday, May 8. Morning and afternoon sessions were held, at which papers in the fields of experimental and social psychology were read and discussed. The discussion on "Psychology and the War Effort" was canceled, because of the inability of the speaker, Dr. Stewart Britt, Director of Psychological Personnel, to leave his work in Washington.

The officers elected to serve for the year 1942-1943 are: Chairman, Dr. Evelyn Raskin of Randolph-Macon Woman's College and Secretary, Dr. Cecile Finley, of the University of Virginia.

1. An Experimental Study of a Possible Objective Criterion of "Tension."

James L. Longley; *College of William and Mary.*

It was hoped in this study to find a positive indication of "tension" through the measurement of the electrical resistance of the individual during a period of non-stimulation, and the change of this basic resistance over a short period of time as indicated by the measurement of the galvanic skin response. It was then planned to correlate the results of this measure with a standard verbal measure of emotional stability.

The apparatus used in measuring the resistance of the subject and the changes of his basic resistance was a wheatstone bridge circuit. As a standard verbal measure of "tension", part IV of the Minnesota Personality Scale was used.

The experimental group consisted of sixty-eight men and women college students of William and Mary. It was found that there was a great sex difference in the men and women subjects. The group was therefore broken up according to sex. The two groups were respectively nineteen men, and forty-nine women.

In the statistical approach to the analysis of the data the subjects were ranked according to scores on the Minnesota Personality Scale. The sex groups were then broken into two equal parts: one group being the stable Minnesota group, and the other group being the unstable Minnesota group. In the case of the men on the Minnesota there was found a critical ratio of 5.58, and on the G. S. R. a critical ratio of .21. Between the Minnesota and the G. S. R. for the men there was a coefficient of correlation of $-.152 \pm .224$. In the case of the women on the G. S. R. there was found a critical ratio of .29. Between the Minnesota and the G. S. R. for the women there was found to be a coefficient of correlation of $-.167 \pm .139$.

The critical ratios for these two groups, and the coefficients of correlation for these two groups seem to indicate quite clearly that according to the procedure used there is a very slight, but insignificant correlation between the measures of "tension" used.

2. An Experimental Study of Individual Differences in Visual "Sensation" and "Perception."

Lawrence L. Leshan; *College of William and Mary.*

The hypothesis of this experiment was that individual differences in classical tests of sensation would be similar to individual differences in classical tests of perception. If they were greater in one than in the other, the inevitable logical conclusion would be that the two kinds of tests measured two different things thus pointing to a two process theory of reception.

Four tests were chosen: 2 sensation (a report of color in a red-blue color wheel in which the percentage of blue visible was changed between judgments, and a determination of the time of existence of a negative after-image) and 2 perception (2 studies of errors in a Muller-Lyer set-up and in a size-constancy set-up)

The relation of the individual differences were studied in four ways: by the coefficients of variation, by the distances in sigma-units from the median to the 10th and 90th percentiles, by the distance in sigma-units from the highest to the lowest case (a measure of "freedom for movement"), and by the shapes of the curves made when the data were plotted.

There was no real difference shown in any of these measures. The coefficients of variation were: color-wheel: .37; after-image: .50; Muller-Lyer: .25 and size constancy .45. The sigma-distance from the medians to the 10th and 90th percentiles also showed no real differences. They were: color-wheel: 1.23 and 1.28; after-images: 1.05 and 1.12; Muller-Lyer: 1.11 and 1.13. The measures of freedom for movement were (in the same order): 3.05; 4.24; 4.07 and 4.83. The curves of the four graphs were markedly similar, all nearly exactly the same shape.

With these four indications of the great similarity in the distribution of individual differences in classical tests of sensation and perception, in a study of forty college students, a one-process theory of reception is strongly suggested.

3. Retention as a Function of Original Reinforcement.

Frank W. Finger; *University of Virginia.*

This experiment was one of a series designed to provide the basis for a quantitative theory of learning. The response of the rat which was studied was the traversal of an elevated runway, 3 feet long, from a starting box to a feeding chamber. The latency of the running response was adopted as the measure of strength of response: as learning progressed, the rat responded more promptly to the opening of the starting box door. A different pattern of reinforcement during acquisition was given to each of 4 groups of 13 rats each: Group I was given 16 reinforced trials with inter-trial intervals of 75 seconds; Group II, 16 trials (at 75 sec. intervals), 8 of which were reinforced; Group III, 8 reinforced trials at 75 seconds intervals; Group IV, 8 reinforced trials, spaced to correspond temporarily to the reinforced trials of Group II. Following the acquisition series a rat was fed for 15 minutes and returned to the home cage. Twenty-four hours after the last acquisition trial he was again placed in the experimental situation and his retention measured in terms of the latency of his running response.

The latency of response at the end of acquisition was found to be a function of the amount of reinforcement received: Group I responded with significantly shorter log latencies than did the other groups. This difference, however, was abolished as a result of the interpolation of the 24-hour retention period, and all groups then responded with essentially identical latencies. The animals having received 8 reinforcements during acquisition retained the habit with virtually no increase in latency. On the other hand, those rats given 16 reinforcements forgot the habit to a significant extent, according to the latency measure.

The conclusion is clearly indicated that level of acquisition and retention are not interchangeable indices of the degree of learning. Further investigation is required to ascertain what additional factors complicate the reinforcement-retention relationship.

4. The Measurement of Carefulness—Impulsiveness by the Self-Inventory Method.

D. M. Allan; *Hampden-Sydney College*.

This self-inventory consists of 60 questions, each requiring a choice of one of four categories of answer, e. g. "Do you make decisions quickly?" Never; occasionally; more often than not; usually, or as a rule. These are given, respectively, the numerical values of 0, 1, 2 and 3. Half of the questions are designed to elicit "carefulness", "deliberateness" and "interest in detail"; the remaining half to evoke subjective estimates of "impulsiveness", "quickness of decision" and "interest in variety of activity" or "interest in meeting new situations." The most highly diagnostic items were found to be: "Do you enjoy prolonged mental work on problems or themes?" and "would you prefer an occupation that demands steady concentration on details?" The present form of the test, administered to 150 male college students and with raw scores (computed on the basis of C minus I values) ranging from +38 to -40, yields a distribution of scores that presents a fair approximation to a normal frequency curve. The reliability, as computed by the split-test method, is +.84 ($\pm .018$), or when corrected by the Spearman-Brown formula, + .91.

Validity: Raw scores on the self-inventory gave a correlation of +.38 with the scholastic average for the current semester, a correlation of +.62 with the surplus of academic percentiles over intelligence score percentiles, and a multiple correlation of these three variables was found to be + .61. Ten subjects rated "very careful" by a group of judges averaged +13, or 78 percentile; ten subjects rated "very impulsive" averaged —9, or 30 percentile, showing a reliable difference. Scores on Carefulness—impulsiveness yield negative correlations of —.19 with intelligence test scores and —.30 with extroversion scores (Root). "Careful" subjects tend to make A scores on the Strong Vocational Interest Blank on engineering, chemistry, architecture, etc.

5. Experimental Method or "Domestic Science"?

David K. Spelt; *Mary Baldwin College*.

One of the major purposes of college courses in science ought to be the development of a clear conception of the nature of scientific method, especially in its experimental aspects. In the achievement of this goal, laboratory work ought to play a significant role. Actually, there is little indication that at present the science course is fulfilling this function. Part of the difficulty may lie in the nature of the laboratory work, which is too often busy work for little fingers or else detailed cook-book exercise in which the student learns only the importance of accuracy and persistence. This situation could be improved by the devising of laboratory courses in which the student progresses from discussions of other people's experiments as illustrations of scientific method, through relatively simple exercises requiring little initiative, to more difficult problems in which the apparatus, methods of work, and treatment of data are established by directed discussion in class.

6. A Survey of Current Literature on War Neuroses.

J. L. Benson; *Washington and Lee University*.

The increasing number of articles about war neuroses in Medical and Military Medical Journals testify that this problem is becoming more and

more recognized. In this survey, war neuroses in their development and treatment are discussed. Modern methods of treatment are compared with the older methods, so as to make the progress in treatment more evident. One of the best methods of ridding the military services of this problem of neuroses is in preventing them. Steps are indicated and discussed which may prove beneficial along these lines. The spreading of the war even to the home front has increased the extent of our fight against the neuroses. The war neuroses are not a matter which can be passed off lightly and they should be given adequate consideration now when we have a chance to prevent much of the needless misery they cause.

7. A Comparison of General and Specific Attitudes Toward War.

John Martire; *Washington and Lee University*.

This survey was made to study the differences between specific and general attitudes toward war and how these attitudes have changed during the past year.

The "Thurstone Scale for Measuring Attitude Toward War" was used to measure the general attitudes while the scale devised by Gilliland and Katzoff, reported in the January, 1941 issue of the *Journal of Psychology* was used for the specific attitudes. These scales consisted of statements to be marked by the subjects, and each statement had a value from 1 to 11 in which the higher the score the more pro-war was the subject on that particular test.

The subjects were 215 Washington and Lee students who were on the Sophomore-Junior level and who ranged from 19-20 years old.

The survey was in two parts: one group of the men was given the scales last Spring, 1941, while a second group was given the scales this May, 1942. There were thus two methods of comparison: the comparison within each group in regard to specific and general attitudes toward war, and the comparison between the two groups who marked the scales one year apart.

General conclusions may be summarized:

1. Both groups do not like war, but
2. They believe that participation in the present conflict is to be desired.
3. Over the past year there has been an increase in the pro-war attitudes, both specific and general.

As measured by these scales, there is a definite difference between specific and general attitudes toward war. These men do not believe in it, but under the present situation and that of a year ago they accept the choice of participation.

8. The College Personnel Program in a Nation at War.

Royal B. Embree, Jr.; *College of William and Mary*.

The entry of this nation into the war has placed a severe burden on the American college. Much of the new pressure connected with higher education can and should be met by personnel organization.

Student personnel work may be defined as that function of higher education which is directly and immediately concerned with the maximal adjustment of individual young men and women.

Personnel organization must take into account all aspects of college life which affect the student, and should always involve definite provision for individual counseling, placement, the guidance of activities, and the supervision of health.

The College of William and Mary in Williamsburg completed plans for the development of a personnel program in 1941, and one aspect of the plan, the student counseling service, was put into operation in September, 1941.

On April 15, 1942, this Counseling Department completed its first six months of activity. During this period, a cumulative record system was

developed, a testing program was established, a number of participating faculty counselors were trained, and personal counseling contacts were had with twenty-five percent of the students enrolled in the college.

It is now possible to present the following summary of procedures and results:

(1) The American Council on Education Psychological Examination was, as had been customary in the past, given to all freshmen.

(2) An added test battery, consisting of the Nelson-Denny Reading Test, the Minnesota Personality Scale, and the Strong Vocational Interest Test was given to 150 students who asked to take these measures and have them interpreted in conferences.

(3) There was no sex difference with regard to the proportions of men and women who came for counseling.

(4) The four classes of the college, freshman, sophomore, junior and senior, were represented in approximately equal proportions among the students who came to the counseling office.

(5) Brilliant, well-poised students and non-scholarly or poorly adjusted students were equally likely to make use of counseling facilities.

(6) Women were more likely than men to take complete vocational test batteries.

(7) The predominant reason for male contacts was study help, while that for female contacts was vocational guidance.

(8) The personal adjustment scores of men taking tests was inferior to that of women, which may reflect the fact that war pressures have thus far been disproportionately heavy for men.

(9) Evidence bearing upon the relationship between counseling and academic achievement is not yet available.

(10) One of the chief values of personnel organization is the fact that it forces an institution to be more mindful of the nature and needs of individual students.

9. The Level of Aspiration Technique as an Experimental Method for the Study of Morale.

James A. Bayton; *Virginia State College*.

Three basic methods have been used in the study of the psychology of morale—clinical interviews and observations, rating scales, and various types of questionnaires. None of these can be considered as experimental methods. The definitions of morale stress two aspects of the problem, goals and confidence in their attainment. The experimental method developed by Preston and Bayton in their work on the level of aspiration provides a technique for the study of ultimate goals, immediate goals, and confidence. The first experiment utilizing this technique is an investigation of morale among Negro college men when competing with White college men, but the method is applicable in the analysis of any morale situation.

10. A Consecutive Study of the Schoolroom Behavior of Children in Relation to the Teachers' Dominative and Socially Integrative Contacts.

Mary Frances Reed; *Virginia Polytechnic Institute*.

Studies by H. H. Anderson and his coworkers indicate that dominative and integrative behavior produce quite different results in interplay. The term domination designated behavior that tended to disregard the desires or contributions of another in situations that concerned the other; integration, behavior that tended to accept differences in another and to cooperate with the other toward some common purpose. Dominative behavior tended to incite domination, integrative behavior incited integration. In a study of two rooms of second grade children and their teachers, Brewer found that children of the more integrative teacher evidenced far

more social contributions, spontaneous behavior, and problem solving than did the children of the more dominative teacher.

Using Brewer's techniques and definitions, a study was made the next year on the same second grade teachers with new groups of children, and on the children who had moved into third grade together with their respective teachers. An observation blank allowed for recording the behavior of one child at a time and simultaneously all the dominative and socially integrative contacts of the teacher which were directed toward that child either as an individual or as a member of a group. Each of 129 children was observed in alphabetical order by five-minute periods for two hours.

One teacher remained predominantly integrative and her children were again consistently higher than the children of the dominating teacher in social contributions and in spontaneity. Intercorrelations between individual contacts of the dominative teacher and child-behavior showed that the more a child dominated others, the more she dominated him; the more she dominated, the more the child non-conformed; and then the more she dominated.

Patterns between third grade teachers were somewhat ambiguous. Evidence continued to support the theses that domination induces domination, and that integration induces integration.

11. Abilities, Interests, and Measurement.

F. Gordon Tice; *Hollins College*.

Completion-type items and self-ratings of abilities and interests were investigated as techniques for measuring personality. Such items as: "List 5 personality traits greatly admired in others . . . your 5 major interests . . . chief dislikes," etc., made possible a far greater spontaneity of response than conventional personality tests allow. In a group of 77 college women, predominantly sophomores, considerable similarity of response occurred, but identical scores on conventional adjustment inventories were often associated with widely different specific responses. In attempting to understand or reconstruct a personality the latter would seem to be more important.

The seven traits most frequently mentioned as being greatly admired in others were, in order, sincerity, friendliness, honesty, sense of humor, unselfishness or generosity, poise, and intelligence. Thirteen listed "poise." Their average social adjustment score on the *Bell Adjustment Inventory* was not significantly different from that of the others, similarly with the home adjustment scores of nine who listed "understanding." Others seemingly diagnostic specific responses also failed to be reflected in average scores.

Self-ratings of musical ability and appreciation were unrelated to scores on the *Seashore Sense of Rhythm Test*. In art, though more often attenuated by modesty, self-ratings of ability were in better agreement with the *Meier-Seashore Art Judgment Test* than were self-ratings of interest. Breadth of interest and breadth of ability scores on the *Walla-Pressey Occupational Orientation Inquiry* correlated $.60 \pm .05$. Though specific interests and abilities tend to coincide, wide discrepancies occur. Measurement should be adapted to the problem of blending the detailed variations of interest and ability harmoniously.

LIST OF MEMBERS

Abbott, Dr. Lynn D. F., Biochem.....	Medical College of Virginia, Richmond, Va.
Acker, Mr. H. G., Education.....	Box 1202, University, Va.
Addington, Mr. L. F., Education.....	Wise, Va.
**Addison, Mr. W. Meade.....	2000 Monument Ave., Richmond, Va.
Addlestone, Prof. J. A., Chemistry.....	P. O. Box 366, Blacksburg, Va.
**Albemarle Paper Manufacturing Co.....	Richmond, Va.
Albright, Dr. C. Leonard, Physics.....	University of Richmond, Va.
Alexander, Mr. Fred M., Education.....	State Board of Education, Richmond, Va.
Allan, Dr. D. Maurice, Psychology.....	Hampden-Sydney, Va.
Berne-Allen, Dr. A., Jr., Chemistry.....	Huntsville Arsenal, Huntsville, Ala.
Allen, Dr. Harriet Whitney, Mathematics.....	2141 Eye St., N. W., Washington, D. C.
Allen, Miss J. Frances, Zoology.....	Box 192, Gary, W. Va.
Allen, Miss L. Jo, Zoology.....	Wytheville, Va.
Alpha Chapter, Chi Beta Phi.....	Randolph-Macon College, Ashland, Va.
Alphin, Mr. Thomas H., Cytogenetics.....	Univ. of Va. Med. School, University, Va.
Altmann, Miss Margaret, Biology.....	Hampton Institute, Hampton, Va.
Ames, Dr. Adeline, Botany.....	Sweet Briar, Va.
Anderson, Prof. Thanning W., Biol.....	Medical College of Virginia, Richmond, Va.
Anderson, Dr. Claude M., Astron.....	Leander McCormick Observatory, University, Va.
Anderson, Mr. Lauren D., Ec. Entom.....	Va. Truck Exp. Station, Norfolk, Va.
Andrews, Mrs. Ruth H.....	The Tuckahoe, Richmond, Va.
Apperly, Dr. Frank L., Pathology.....	Medical College of Virginia, Richmond, Va.
Appleby, Dr. Aaron, Biology.....	Box 46, Blacksburg, Va.
Armstrong, A. R., Chemistry.....	Williamsburg, Va.
Arnim, Dr. S. S., Dentistry.....	Medical College of Virginia, Richmond, Va.
Arnold, Mr. Robt. B., Chemistry.....	Box 726, Richmond, Va.
Artz, Miss Lena, Botany.....	644 N. Jackson Street, Arlington, Va.
Ash, Dr. Roy P., Biology.....	Box 1066, Williamsburg, Va.
Ashworth, Dr. O. O., Medicine.....	Medical Arts Bldg., Richmond, Va.
Baecher, Mr. John Joseph, Biology.....	Law Building, Norfolk, Va.
Bailey, Dr. John W., Zoology.....	Box 107, University of Richmond, Va.
Baird, Miss Kathleen, Medicine.....	Disputanta, Va.
Baker, Mr. Percy H., Biology.....	Va. State College, Ettrick, Va.
Baldock, Mr. C. Russell, Physics.....	Virginia Polytechnic Institute, Blacksburg, Va.
Baldwin, Mr. F. O., Ind. Chem.....	5108 Belleau Road, Richmond, Va.
Balthis, Mr. Thomas A., Chemistry.....	3301 Grove Avenue, Richmond, Va.
Barclay, Mr. George C., Geol.....	2912 Washington Avenue, Newport News, Va.
Bare, Mr. C. O., Entomology.....	Box 7062, Richmond, Va.
Barnwell, Mr. Allan M., Chemistry.....	531 Riverside Avenue, Covington, Va.
Barrell, Mr. Robert P., Psychology.....	Buckingham, Va.
Barrett, Mr. William H., Education.....	Principal Marshall Dist. High School, Arvonia, Va.
Bass, Mr. Charles E., Geology.....	Box 43, Stephens City, Va.
Bates, Dr. Robert L., Psychology.....	V. M. I., Lexington, Va.
Baumeister, Miss Elizabeth M., Bacteriol.....	1016 A. Street, Portsmouth, Va.
Bayton, Dr. James A., Psychology.....	Va. State College, Ettrick, Va.
Beams, Dr. Jesse W., Physics.....	Rouss Physical Laboratory, University, Va.
Bear, Dr. Harry, Dentistry.....	Medical College of Virginia, Richmond, Va.
Becker, Miss Edna, Biology.....	Hollins College, Va.
Bell, Miss Helen, Chemistry.....	Route 1, Mt. Solon, Va.
Bengtson, Mr. A. W., Medicine.....	Catawba Sanitarium, Va.
Bennett, Miss Ercelle, Biology.....	Box 92-A, S. T. C., Radford, Va.
Benson, Miss Caroline, Chemistry.....	Mary Baldwin College, Staunton, Va.
Benton, Prof. Arthur F., Chemistry.....	University, Va.
Berkeley, Ensign Edmund, Biology.....	300 Church Street, White Plains, New York
Berry, Mr. R. C., Chemistry.....	1101 State Office Bldg., Richmond, Va.
Beta Kappa Phi Science Society.....	Richmond Professional Institute, Richmond, Va.
Bethel, Mr. James S., Forestry.....	V. P. I., Blacksburg, Va.
Betts, Mr. Edwin W., Taxonomy.....	Box 1203, University, Va.

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Bevan, Dr. Arthur, Geology.....	Box 1428, University, Va.
Bierer, Mr. James H., Geology.....	Washington & Lee University, Lexington, Va.
Bigger, Dr. I. A., Surgery.....	Medical College of Virginia, Richmond, Va.
Bird, Mr. Lloyd C., Bacteriology.....	915 E. Cary Street, Richmond, Va.
Blades, Dr. J. F., Surgery.....	Medical College of Virginia, Richmond, Va.
Blair, Mr. William J., Chemistry.....	1121 State Office Bldg., Richmond, Va.
Blank, Miss Grace J., Medicine.....	Chandler Court, Williamsburg, Va.
Blanton, Dr. Wyndham B., Med.....	828 W. Franklin Street, Richmond, Va.
Blincoe, Dr. J. W., Mathematics.....	University of Tennessee, Knoxville, Tenn.
Bloomer, Mr. Richard R., Geology.....	541 Brandon Avenue, Charlottesville, Va.
Bloomer, Mr. Robert O., Geology.....	Box 1428, University, Va.
Blume, Mr. G. W. J., Chemistry.....	2814 Third Avenue, Richmond, Va.
Blunt, Mr. Chas. P., III, Medicine.....	Medical College of Virginia, Richmond, Va.
Boggs, Prof. Isabel, Physics.....	Box 235, R.-M. W. College, Lynchburg, Va.
Bond, Dr. Eva, Psychology.....	3519 13th Street, N. W., Washington, D. C.
Bosman, Mr. Robert I., Biology.....	1138 Hanover Avenue, Norfolk, Va.
Bowden, Mr. Wray M., Biology.....	Blandy Exper. Farm, Boyce, Va.
Bowen, Dr. Leroy E., Vet. Medicine.....	1415 Main Street, Lynchburg, Va.
Bowman, Dr. Paul W., Botany.....	3114 5th Street, N., Arlington, Va.
Bowman, Dr. Raymond P. G., Educ.....	Route 1, Harrisonburg, Va.
Boys, Dr. Floyd, Surgery.....	University, Va.
Brashears, Dr. Alton D., Dentistry.....	Medical College of Virginia, Richmond, Va.
Bray, Dr. Robert S., Zoology.....	R. F. D. 2, Herndon, Va.
Bray, Dr. W. E., Medicine.....	University, Va.
Brewbaker, Mr. J. J., Education.....	422 Westover Avenue, Norfolk, Va.
Bridgers, Mr. M. Warren, Pharmacy.....	3106 3rd Avenue, Richmond, Va.
Britton, Dr. S. W., Endocrinology.....	University, Va.
Broadwater, Mr. E. B., Education.....	Salem, Va.
Brown, Dr. Frederick L., Physics.....	Box 1052, University, Va.
Brown, Mr. Irby H., Chemistry.....	1121 State Office Bldg., Richmond, Va.
Brown, Dr. J. R. C., Jr., Chem.....	Long Hill Road, R. F. D., Chatham, N. J.
Brown, Dr. Sarah, Psychology.....	149 Carrollton Road, Norfolk, Va.
Brown, Dr. Thomas D., Protozoology.....	513 Ridge Street, Charlottesville, Va.
Brown, Mr. W. R., Geology.....	Va. Geological Survey, Charlottesville, Va.
Brown, Dr. William M., Psychol.....	12 Gainsborough Road, Scarsdale, N. Y.
Brown, Capt W. W., Chemistry.....	Staunton Military Academy, Staunton, Va.
***Bryan, Mr. John Stewart.....	% News Leader, Richmond, Va.
Bull, Mr. Fred W., Chemistry.....	V. P. I., B'acksburg, Va.
Bullington, Dr. W. E., Protozoology.....	R.-M. College, Ashland, Va.
Burch, Dr. Paul R., Zoology.....	State Teachers College, East Radford, Va.
Burger, Dr. Alfred, Chemistry.....	Cobb Chemical Laboratory, University, Va.
Burger, Miss Elizabeth, Biology.....	Box 367, Farmville, Va.
Burkette, Miss Josephine L., Biology.....	Southern Seminary, Buena Vista, Va.
Burruss, Dr. Julian A., Education.....	Blacksburg, Va.
Burton, Miss Peggy Jane.....	State Teachers College, Radford, Va.
Bussinger, Mr. C. M., Education	Jackson Memorial High School, Austinville, Va.
Byrne, Col. William E., Math.....	Box 836, Lexington, Va.
Calderwood, Dr. H. N., Chemistry.....	1819 G Street, N. W., Washington, D. C.
Calkins, Miss E'eanor, Math.....	Chandler Court, Williamsburg, Va.
Callahan, Mr. William H., Geology	15 Master Street, Franklin, N. J.
Campbell, Mr. Malcolm, Psychology.....	416 Monroe Lane, University, Va.
Campbell, Dr. T. Wood, Dentistry.....	Box 12, Suffolk, Va.
Cantor, Dr. H., Surgery.....	Medical Arts Building, Petersburg, Va.
Carmichael, Mr. Omer, Educ.....	Supt. Public Schools, Lynchburg, Va.
Carpenter, Prof. D. R., Math.....	Roanoke College, Salem, Va.
**Carrington, Mr. T. M.	930 Park Avenue, Richmond, Va.
Carroll, Lt. Col. Robt. P., Biol.....	8 Honeysuckle Hill, Lexington, Va.
Carter, Miss Jeanette S., Zoology.....	Univ. Va. Hospital, University, Va.
*Carter, Mr. Spencer L.	2338 Monument Avenue, Richmond, Va.

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Carter, Mr. Trevor.....	Pulaski, Va.
Carver, Dr. Merton E., Psychol.....	University of Richmond, Va.
Cary, Mr. Hunsdon, Educ.....	Mutual Building, Richmond, Va.
Cary, Miss M. Katherine, Biochem.....	Medical College of Virginia, Richmond, Va.
Cash, Dr. J. R., Path.....	University Hospital, Charlottesville, Va.
Cato, Mr. William H., Educ.....	316 Fourteenth Street, Charlottesville, Va.
Cederstrom, Mr. D. John, Geol.....	1109 Wertland Street, Charlottesville, Va.
Chapman, Dr. Douglas G., Med.....	617 W. Grace Street, Richmond, Va.
Chappelear, Prof. Geo. W., Jr., Bot.....	Madison College, Harrisonburg, Va.
Chase, Mr. H. M., Chem.....	1002 Main Street, Danville, Va.
Chestnut, Mr. Alfonse, Biol.....	Dept. Zool., Rutgers Univ. New Brunswick, N. J.
Chevalier, Dr. P. L., Dentistry.....	410 Professional Bldg., Richmond, Va.
Christian, Mrs. Sue B., Biology.....	% J. R. Booker, Gladstone, Va.
Christopher, Mr. J. T., Chem.....	944 Green Street, Danville, Va.
Clark, Mr. Austin H., Echinoderms.....	Smithsonian Bldg., Washington, D. C.
Clark, Mr. Shreve, Engineering.....	Va. Dept. of Highways, Richmond, Va.
Clark, 1st Lt. Walter E., Chemistry.....	Fort Myers, Va.
Clarkson, Dr. Wright, Radiol.....	30 Franklin Street, Petersburg, Va.
Clayton-Grimes Biology Club.....	College of William & Mary, Williamsburg, Va.
Clift, Mr. William, Chem.....	915 E. Cary Street, Richmond, Va.
Cline, Mr. Justus H., Biol.....	Stuarts' Draft, Va.
Clough, Dr. O. W., Dentistry.....	Medical College of Virginia, Richmond, Va.
Clower, James I., Chem.....	Box 575, Blacksburg, Va.
Cocke, Prof. E. C., Biology.....	Wake Forest College, Wake Forest, N. C.
Cocks, Prof. M. Estes, Physics.....	Hollins College, Va.
Coffey, Mr. Samuel J., Education.....	Moneta, Va.
Cole, Miss Al'ize, Medicine	Medical College of Virginia, Richmond, Va.
Cole, Mr. James W., Jr., Chemistry.....	Cobb Chemical Laboratory, University, Va.
Cole, Dr. Nancy, Mathematics	Sweet Briar, Va.
Coleman, Mr. W. G., Education	Principal Marshall High School, Marshall, Va.
*College of William & Mary	Williamsburg, Va.
Conner, Miss Betty V., Zoology.....	Box 206, Blacksburg, Va.
Cook, Mr. Harold T., Mycology	840 E. Green Street, Norfolk, Va.
Cook, Dr. Roy S., Chemistry	Mary Washington College, Fredericksburg, Va.
Cooper, Dr. Albert H., Engineering	Box 177, Blacksburg, Va.
Cooper, Miss Nannie McJ., Biol.....	114 S. Market Street, Petersburg, Va.
Cornish, Miss Helen Rhoda, Biology.....	Va. Intermont College, Bristol, Va.
Cornwe'l, Mr. Ralph T. K., Chem.....	Sylvania Industrial Corp., Fredericksburg, Va.
Cosby, Mr. Clifton B., Biology	2802 Garland Avenue, Richmond, Va.
Cosby, Miss Evelyn Linda, Biol.....	2101 E. Marshall Street, Richmond, Va.
Cosby, Mr. J. Reginald, Physics	West. Union Research Lab., Southampton, L. I., N. Y.
Coulbourn, Mr. Uriah F., Geology	Suffolk, Va.
Coyner, Mr. M. Boyd, Psychology	Box 123, Farmville, Va.
Crim, Miss Samuella Hawes, Biology	Box 156, New Market, Va.
Crooks, Mr. K. B. M., Parasitol.....	Happy Grove College, Hectors River, Jamaica, B. W. I.
Cross, Mr. R. H., Jr., Biology	Box 754, Marion, Va.
Crowgey, Mr. John H., Education	Court House, Wytheville, Va.
Cruise, Miss Anita, Zoology.....	Andrew Lewis H. S., Salem, Va.
Culbertson, Mr. A. B., Biology.....	Box 511, Blacksburg, Va.
Custis, Miss Elizabeth, Home Econ.....	Fincastle, Va.
Dabney, Mr. Virginius.....	12 Tapoan Road, Richmond, Va.
Daffin, Prof. John B., Physics.....	Mary Baldwin College, Staunton, Va.
Darden, Miss Grace.....	Madison College, Harrisonburg, Va.
Darner, Miss Daisy, Chemistry	Jefferson, Md.
Daughtrey, Miss Mary Virginia, Chemistry	3803 Seminary Avenue, Richmond, Va.
**Davenport & Co.....	1113 E. Main Street, Richmond, Va.
Davenport, Mr. Roswell B., Engineering	St. Andrew's Lane, Richmond, Va.
Davis, Dr. Donald W., Genetics.....	349 W. Scotland Street, Williamsburg, Va.
Davis, Miss Eloise M., Biology.....	Route 5, Box 35, Richmond, Va.

Davis, Miss Georgie T., Biology.....	Box 627, Blacksburg, Va.
Davis, Mr. Hubert J., Biology.....	Matthew Whaley High School, Williamsburg, Va.
Davis, Mr. Jackson, Educ.....	% General Education Board, 49 W. 49 St., N. Y. City
Davis, Mr. Thomas, Astronomy.....	V. P. I., Blacksburg, Va.
Davis, Major W. B., Eng.....	Room 418, State Office Bldg., Richmond, Va.
Dear, Mr. Paul S., Ceramics.....	V. P. I., Blacksburg, Va.
Decker, Miss Mary G., Chemistry.....	Alabama College, Montevallo, Ala.
DeHaven, Mr. Foy, Education.....	Wytheville, Va.
DeLaBarre, Prof. C. F., Biology.....	Blacksburg, Va.
Delisle, Dr. Albert L., Botany.....	College of William & Mary, Williamsburg, Va.
Derr, Mr. H. B., Biology.....	R. F. D. 2, Fairfax, Va.
Desha, Dr. L. J., Chemistry.....	Washington & Lee University, Lexington, Va.
Devereux, Mr. Robert E., Geology.....	123 S. Main Street, Danville, Va.
Dickerson, Dr. L. M., Agriculture.....	R. F. D. 2, Charlotte Rd., Spartansburg, S. C.
Dinwiddie, Dr. J. G., Chemistry.....	620 Walnut Avenue, Waynesboro, Va.
Divine, Dr. J. P., Nutrition.....	1206 N. Quincy Street, Arlington, Va.
Dodson, Dr. A. I., Urology.....	Professional Bldg., Richmond, Va.
Drinkard, Dr. A. W., Jr., Agriculture.....	V. P. I., Blacksburg, Va.
DuBeau, Mr. Normand P., Education.....	Richmond News Leader, Richmond, Va.
Duke, Miss Martha Walker, Biol.....	721 Park Street, Charlottesville, Va.
***DuPont, Mrs. Alfred I.....	Nemours, Wilmington, Del.
Dyck, Mr. P. B., Medicine.....	Blacksburg, Va.
Early, Mr. J. M., Pharmacy.....	Medical College of Virginia, Richmond, Va.
Eddy, Mr. C. Vernon, Education.....	430 Fairmont Avenue, Winchester, Va.
Edmundson, Dr. R. S., Geology.....	1109 Wertland Street, Charlottesville, Va.
Edwards, Dr. Preston, Physics.....	Sweet Briar, Va.
Eheart, Mr. James F., Chemistry.....	V. P. I., Blacksburg, Va.
Elder, Mr. Joseph D., Physics.....	302 Langhorne Lane, Lynchburg, Va.
Ellett, Mr. W. B., Chemistry.....	Blacksburg, Va.
Elliott, Dr. Emmet R., Mathematics.....	Hampden-Sydney, Va.
Ellis, Miss Frances.....	Madison College, Harrisonburg, Va.
Embree, Prof. Royal B., Jr., Psychology.....	College of William & Mary, Williamsburg, Va.
Evans, Dr. Everett I., Medicine	Medical College of Virginia, Richmond, Va.
Evans, Mr. L. S.....	Blue Shingles, Butte Lane, Richmond, Va.
Fales, Dr. Doris E., Biology.....	1511 Hampton Street, Richmond, Va.
Farinholt, Dr. L. H., Chemistry.....	Washington & Lee University, Lexington, Va.
Farnsworth, Miss Goldena, Physics.....	Hollins College, Va.
Farquhar, Dr. B. S., Chemistry.....	361 Maple Avenue, Waynesboro, Va.
Farrar, Mr. George M., Pharmacy.....	Clifton Forge, Va.
Fedoroff, Dr. Basil T., Chemistry.....	% Fraser-Brace Eng. Co., Weldon Springs, Mo.
Fentress, Mr. Walter L.....	32 Roanoke Dock, Norfolk, Va.
Ferguson, Dr. F. F., Zoology	College of William & Mary, Norfolk, Va.
Ferguson, Mrs. Mary V., Bacteriol.....	1324 51st Street, Norfolk, Va.
Ferneyhough, Dr. Robert E., Vet. Med.....	810 Lee Street, Warrenton, Va.
Finger, Prof. Frank W., Psychology.....	Peabody Hall, University, Va.
Fillinger, Miss Harriet H., Chemistry.....	Hollins College, Va.
Finley, Mrs. J. N. G., Psychology.....	Rugby Road, University, Va.
Fischer, Prof. Alfred G., Geology.....	Box 829, Blacksburg, Va.
Fisher, Dr. Ernst, Physiology.....	Medical College of Virginia Richmond, Va.
Fish, Prof. F. H., Chemistry.....	Box 102, Blacksburg, Va.
Fisher, Miss Charlotte, Biology.....	S. T. C., Radford, Va.
Flemer, Capt. J. A., Eng.....	Westmoreland County, Oak Grove, Va.
Fletcher, Dr. F. P., Medicine	2319 E. Broad Street, Richmond, Va.
Fletcher, Miss Patsy, Biology	Warrenton, Va.
Flora, Dr. Carroll C., Dairy Science.....	Va. Polytechnic Institute, Blacksburg, Va.
Florance, Miss Sue A., Biology	R. F. D. 3, Box 329, Alexandria, Va.
Flores, Miss Lydia E., Biology.....	S. T. C., Radford, Va.
Flory, Mr. Robert M., Psychology.....	Dept. of Psychology, University, Va.

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Forbes, Dr. J. C., Biochemistry.....	Medical College of Virginia, Richmond, Va.
Foster, Major I. G., Physics.....	V. M. I., Lexington, Va.
Freeman, Dr. Douglas S., Economics.....	% News Leader, Richmond, Va.
Freer, Prof. Ruskin S., Botany.....	Lynchburg College, Lynchburg, Va.
French, Dean C. Clement, Chemistry.....	R.-M. W. College, Lynchburg, Va.
French, Mr. G. Talbot, Botany.....	1112 State Office Bldg, Richmond, Va.
Friedline, Dr. Cora L., Psychology.....	R.-M. W. College, Lynchburg, Va.
Frierson, Dr. W. J., Chemistry.....	Hampden-Sydney, Va.
Furtach, Dr. E. F., Chemistry.....	Blacksburg, Va.
Gaines, Prof. Robert E., Mathematics.....	University of Richmond, Va.
Galvin, Mr. W. Roland, Physics.....	214 S. Boulevard, Richmond, Va.
Gant, Dr. James Q., Jr., Medicine.....	Nat. Inst. of Health, Bethesda, Md.
Garber, Mr. Thomas H., Chemistry.....	Larus and Brother Co., Inc., Richmond, Va.
Garland, Mr. Floyd H., Chemistry.....	South Hill, Va.
Garnett Mr. Henry S., Jr., Chemistry.....	Beaver Dam, Va.
Garrett, Dr. H. E., Psychology.....	35 Claremont Avenue, New York, N. Y.
Gaskins, Mr. Pat, Chemistry.....	Phipps & Bird, Inc., Richmond, Va.
Geldard, Maj. Frank A., Psychology.....	3628 Potomac Avenue, Fort Worth, Texas
Gilbert, Dr. Chauncey McL., Anatomy.....	Box 1453, University, Va.
Gildersleeve, Mr. Benjamin, Geology.....	Tennessee Valley Authority, Knoxville, Tenn.
Gillespie, Miss Elizabeth, Chemistry.....	701 Botetourt Apts., Norfolk, Va.
Gilmer, Prof. Thomas E., Physics.....	Hampden-Sydney, Va.
Gladding, Mr. Randolph N., Chem.....	1123 State Office Bldg., Richmond, Va.
Glass, Miss Jewel J., Geology.....	U. S. Geological Survey, Washington, D. C.
Glick, Prof. J. Paul, Education.....	Blackstone College, Blackstone, Va.
Gooch, Mr. Winslow L., Forestry.....	The Chesapeake Corp., West Point, Va.
Gottschalk, Mr. Carl W., Biology.....	Roanoke College, Salem, Va.
Graham, Miss Helen, Biology.....	S. T. C., Radford, Va.
Graves, Mr. E. Boyd, Education.....	Mary Washington College, Fredericksburg, Va.
Graybeal, Prof. H. C., Physics.....	State Teachers College, East Radford, Va.
Grayson, Mr. James McDonald, Entomology.....	V. P. I., Blacksburg, Va.
Greer, Mr. W. Rutledge, Physics.....	Blacksburg, Va.
Gregory, Mr. Charles, Math.....	708 Richmond Road, Williamsburg, Va.
Gregory, Dr. Walton C., Biology.....	Tenn. Pol. Inst., Cookeville, Tenn.
Grille, Mr. George A., Jrr., Chemistry.....	1704 37th St., N. W., Washington, D. C.
Grizzard, Dr. A. L., Agronomy.....	Blacksburg, Va.
Grizzard, Miss Alice E., Zoology.....	Boydkins, Va.
Groseclose, Miss Nancy P., Biology.....	202 N. Marion Street, Covington, Va.
Grover, Mr. W. W., Zoology.....	Box 97, Lexington, Va.
Groves, Dr. A. B., Phytopath.....	1415 Greystone Terrace, Winchester, Va.
Gudheim, Prof. H., Mathematics.....	Blacksburg, Va.
Guy, Dr. William G., Chemistry.....	Williamsburg, Va.
Gwathmey, Dr. Allan T., Chemistry.....	Colonnade Club, University, Va.
Haag, Dr. H. B., Pharmacol.....	Medical College of Virginia, Richmond, Va.
Hackerman, Dr. Norman	Box 356, Blacksburg, Va.
Hague, Dr. Florence S., Zoology.....	Sweet Briar, Va.
Hale, Mr. Clarence, Education.....	561 Walnut Street, Waynesboro, Va.
Hall, Dr. J. Frank, Dentistry.....	1121 W. Michigan Street, Indianapolis, Ind.
Hall, Dr. James K., Psychiatry.....	3011 Seminary Avenue, Richmond Va.
Hamaker, Dr. J. I., Zoology.....	R.-M. W. College, Lynchburg, Va.
Hampton Institute	Hampton, Va.
Hand'ey, Mr. C. O., Biology	Blacksburg, Va.
Handy, Dr. E. S. Craighill, Anthropol.....	The Burnie Farm, Fairfax Cty. Oakton, Va.
Hamner, Mr. H. Rupert, Chemistry.....	400 Petersburg Tpk., Richmond, Va.
Har'an, Dr. William R., Chemistry.....	329 Greenway Lane, Richmond, Va.
Harlow, Mr. E. S., Chemistry.....	400 Petersburg Turnpike, Richmond, Va.
Harmon, Mr. Robert K., Chem. Eng.....	P. O. Box 99, Charlottesville, Va.
Harper, Dr. R. A., Botany.....	Route 5, Bedford, Va.

Harrar, Dr. J. G., Phytopathol.	Box 429, Blacksburg, Va.
Harrington, Mr. John W., Geology	1611 Laburnum Avenue, Richmond, Va.
Harris, Mr. H. Hiter	P. O. Box 6-R, Richmond, Va.
Harris, Prof. Isabel, Math.	Westhampton College, University of Richmond, Va.
Harrison, Dr. Guy R., Dentistry	Professional Bldg., Richmond, Va.
Hatcher, Dr. T. W., Mathematics	Blacksburg, Va.
Haynes, Prof. F. B., Physics	Blacksburg, Va.
Heatwole, Mr. Earl P., Eng.	1512 Live Oak Drive, Silver Spring, Md.
Heflin, Lt. Col. S. M., Physics	508 Highland Road, Lexington, Va.
Hegwood, Miss Muriel, Biology	402 Randolph Street, Radford, Va.
Henderson, Prof. Lena B., Ecology	Box 16, R.-M. W. College, Lynchburg, Va.
Henderson, Mr. Myron P., Biology	Roanoke College, Salem, Va.
Henderson, Mr. R. G., Phytopath.	Blacksburg, Va.
Henneman, Dr. Richard H., Psychology	Box 643, Williamsburg, Va.
Hess, Dr. Margaret, Zoology	Winthrop College, Rock Hill, S. C.
Hibbard, Mr. Foy N., Astronomy	U. S. Weather Bureau, Richmond, Va.
Hibbs, Dr. Henry H., Jr., Education	901 West Franklin Street, Richmond, Va.
Hill, Prof. H. H., Chemistry	V. P. I., Blacksburg, Va.
Hill, Mr. John S., Agriculture	Stuarts' Draft, Va.
Hill, Mr. Julien H.	State Planters Bank & Trust Co., Richmond, Va.
Hillman, Dr. Rolfe L., Medicine	Emory, Va.
Himmeler, Mr. Lowell W., Chemistry	47 Lock Lane, Apt. 3, Richmond, Va.
Hinton, Dr. W. W., Psychology	Box 398, Lexington, Va.
Hodges, Dr. Fred M., Radiology	1000 W. Franklin Street, Richmond, Va.
Hodgkin, Dr. W. N., Dentistry	Warrenton, Va.
Hoefer, Miss Allene, Nursing	S. T. C., Radford, Va.
Hoffman, Dr. R. M., Chemistry	560 Walnut Avenue, Waynesboro, Va.
Hofmann, Dr. Fred W., Phytopath.	Blacksburg, Va.
Hoke, Dr. K. J., Education	College of William & Mary, Williamsburg, Va.
Hodaway, Prof. C. W., Nutrition	Box 85, Blacksburg, Va.
Holden, Dr. R. J., Geology	V. P. I., Blacksburg, Va.
Holladay, Miss Natalie, Biology	510 Rugby Road, Charlottesville, Va.
Hollins Curie Chemistry Society	Hollins College, Va.
Holmes, Mr. Booker T., Chemistry	Va. Union Univ., Norfolk, Va.
Homes, Dr. F. T., Physics	Box 1068, University, Va.
Holsinger, Mr. C. K., Education	Henrico Court House, Richmond, Va.
Holt, Mr. Yuille, Jr., Biology	818 Pershing Square, Lynchburg, Va.
Hook, Mr. Paul G., Education	Box 223, Clifton Forge, Va.
Horn, Mrs. Amanda P., Biology	Box 183, Hampton Inst., Hampton, Va.
Horn, Mr. Egmont, Geology	Washington & Lee University, Lexington, Va.
Horsley, Dr. Guy W., Medicine	617 W. Grace St., Richmond, Va.
Horsley, Dr. J. Shelton, Medicine	617 W. Grace Street, Richmond, Va.
Hosey, Mr. Andrew D., Chemistry	1123 State Office Bldg., Richmond, Va.
Hostetter, Dr. Ralph, Biol.	Eastern Mennonite School, Harrisonburg, Va.
Hough, Dr. W. S., Entomology	Winchester, Va.
Howard, Mr. M. C., Forestry	U. S. Forest Service, Harrisonburg, Va.
Howe, Dr. Jas. L., Chemistry	Lexington, Va.
Hoxton, Dr. L. G., Physics	University, Va.
Hoyt, William Dana, Biology	Washington & Lee University, Lexington, Va.
Huddle, Mr. Charles R., Eng. Chem.	Ivanhoe, Va.
Hudson, Miss Helen, Biology	S. T. C., Radford, Va.
Hughes, Mrs. R. D., Protozool.	Medical College of Virginia, Richmond, Va.
Hunley, Col. Wm. M., Psychology	V. M. I., Lexington, Va.
Hunt, Mr. Harvey L., Chemistry	288 Bank Street, Norfolk, Va.
Hunter Mr. John S., Jr., Geology	15 Moreland Avenue, Newton Center, Mass.
Hussey, Dr. R. E., Chemistry	Blacksburg, Va.
Husted, Mr. John E., Geology	522 Dav Avenue, S. W., Roanoke, Va.
Husted, Dr. Ladley, Biology	Biology Building, University, Va.
Hutcheson, Dr. T. B., Agriculture	V. P. I., Blacksburg, Va.
Hutchinson, Miss Madge, Biology	Hollins College, Va.

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Ilitis, Dr. Hugo, Biology.....	818 Marye Street, Fredericksburg, Va.
Ingles, Mr. Andrew L., Biology.....	Biological Laboratory, University, Va.
Ingram, Miss Lucille B., Biology.....	Dundas, Va.
Irwin, Mr. Carl, Medicine.....	401 Collicell Street, Harrisonburg, Va.
Ives, Mr. R. L., Pharmacy.....	503 West Olney Road, Norfolk, Va.
Jackson, Dr. H. W., Zoology.....	Box 527, Blacksburg, Va.
Jackson, Mr. Minter Morgan, Psychology.....	Department of Psychology, University, Va.
James, Mr. G. Watson, III, Medicine.....	Lexington, Va.
James, Major Harold C., Physics.....	Kable Station 62, Staunton, Va.
Jarman, Dr. A. M., Education.....	1872 Winston Avenue, Charlottesville, Va.
Jeffers, Dr. George W., Biology.....	State Teachers College, Farmville, Va.
Jefferson, Mr. R. N., Entomology.....	Blacksburg, Va.
Jelinek, Mr. Hans, Psychology.....	Medical College of Virginia, Richmond, Va.
Johnson, Miss Bessie L.	Madison College, Harrisonburg, Va.
Johnson, Dr. E. P., Medicine.....	Blacksburg, Va.
Johnson, Dr. Harry I., Chemistry.....	Roanoke College, Salem, Va.
Johnson, Mr. J. H., Forestry.....	Box 534, West Point, Va.
Johnston, Mr. Charles W., Chemistry.....	214 Broad Street, Portsmouth, Va.
Jones, Mr. A. L., Chemistry.....	Cobb Chem. Lab., University, Va.
Jones, Mr. Arthur W., Biology.....	Miller School of Biology, University, Va.
Jones, Mr. Claiborne S., Zoology.....	307 Park Place, Charlottesville, Va.
Jones, Dr. B. Ruffin, Jr., Biology.....	College of William & Mary, Norfolk, Va.
Jones, Mr. Homer D., Jr., Geology.....	Koppers Company, Kearny, N. J.
Jones, Prof. J. B. Mech, Engineering.....	Box 205, Blacksburg, Va.
Jones, Mr. J. Claggett, Chemistry.....	1121 State Office Bldg., Richmond, Va.
Jones, Mr. J. Frasia, Jr., Medicine.....	928 W. Franklin St., Richmond, Va.
Jones, Mr. W. Catesby, Chemistry.....	3817 Hawthorne Ave., Richmond, Va.
Jones Biological Society.....	College of William & Mary, Norfolk, Va.
Jopson, Dr. Harry G. M., Biology.....	Bridgewater College, Bridgewater, Va.
Jordan, Dr. H. E., Medicine.....	University, Va.
Joyner, Mr. William H., Pharmacy.....	222 North Saratoga Street, Suffolk, Va.
Kammerer, Mr. John, Geology.....	Washington & Lee University, Lexington, Va.
Kapp, Dr. Mary E., Chemistry.....	College of William & Mary, Richmond, Va.
Katzin, Dr. Leonard I., Physiology.....	Strong Memorial Hospital, Rochester, New York
Keeble, Prof. W. H., Physics.....	R.-M. College, Ashland, Va.
Kehrer, Mr. Victor J., Biology.....	Va. Episcopal School, Lynchburg, Va.
Keller, Dean May L., Education.....	University of Richmond, Va.
Kelly, Miss Carolyn.....	S. T. C., Radford, Va.
Kennedy, Dr. C. P., Dentistry.....	Box 479, Fredericksburg, Va.
Kepner, Dr. William A., Zoology.....	University, Va.
Keyser, Dr. Linwood D., Surgery.....	Medical Arts Bldg., Roanoke, Va.
Kilbourne, Maj. Gen. C. E., Education.....	Va. Military Institute, Lexington, Va.
Kilby, Dr. C. M., Physics.....	R.-M. W. College, Lynchburg, Va.
Kindred, Dr. J. E., Histology.....	Box 1341, University, Va.
King, Mr. E. W., Biology.....	V. P. I., Blacksburg, Va.
Kolipinski, Dr. Louis, Psychiatry.....	Base Hospital No. 45, Camp Lee, Va.
Koontz, Miss Anna	Madison College, Harrisonburg, Va.
Krause, Dr. Heinrich, Biology.....	510 Fort Street, Pensacola, Florida
Lafayette, Mr. N. W., General Science.....	920 N. Kansas Street, Arlington, Va.
Lambert, Dean J. Wilfred, Psychology.....	Williamsburg, Va.
Lammers, Dr. Edward C. H., Geology.....	202 McDowell Street, Lexington, Va.
Lancaster, Mr. Dabney S., Education.....	1816 Park Avenue, Richmond, Va.
Lancaster, Mr. J. L., Education.....	309 England Street, Ashland, Va.
Lane, Mr. E. H., Chemistry	The Lane Co., Altavista, Va.
Langston, Dr. Henry J., Medicine.....	Masonic Temp'e Bldg., Danville, Va.
Lankford, Mr. F. G., Jr., Education.....	Dept. of Secondary Education, University, Va.
Lansche, Mr. Arnold M., Chemistry.....	Randolph-Macon College, Ashland, Va.

Larew, Dr. Gillie A., Mathematics.....	R.-M. W. College, Lynchburg, Va.
Larner, Miss Jean L., Chemistry.....	18 Fifth Street, Pulaski, Va.
Lawson, Dr. George McL., Medicine.....	School of Medicine, University, Va.
Leatherburg, Miss Mildred.....	Machipongo, Va.
Lee, Prof. Claudio, Physics.....	V. P. I., Blacksburg, Va.
Lee, Mrs. Raymond C.....	Box 613, % Postmaster, Seattle, Wash.
Leed, Mr. Russell, Chemistry.....	430 Parade Avenue, Lexington, Va.
Lehman, Dr. Edwin P., Medicine.....	Box 1596, University, Va.
Leveque, Mr. Roland J., Chemistry.....	Phipps & Bird, Inc., Richmond, Va.
Lewis, Dean Ivey F., Botany.....	Box 1885, University Station, Charlottesville, Va.
Lewis, Mr. John B., Biology.....	Seward Forest, Triplett, Va.
Lewis, Miss Naomi, Entomology.....	3112 Grove Avenue, Richmond, Va.
Lillard, Lt. William D., Chemistry.....	Orange, Va.
Lindsay, Mr. J. R., Chemistry.....	1123 State Office Bldg., Richmond, Va.
Linfield, Dr. B. Z., Mathematics.....	University, Va.
Lipscomb, Miss Martha H., Biology.....	Watts Bar Dam, Tenn.
Littleton, Dr. Leonidas R., Chemistry.....	1611 N. Greenbrier St., Arlington, Va.
Lochhead, Mr. John H., Biology.....	College of William & Mary, Williamsburg, Va.
Longree, Miss Karla, Botany.....	Hampton Institute, Hampton, Va.
Long, Dr. Louis, Jr.....	Cobb Chemical Laboratory, University, Va.
Loth, Mr. Francis, Conservation.....	Box 518, Waynesboro, Va.
Loving, Dr. R. E., Physics.....	University of Richmond, Va.
Lucas, Prof. James B., Chemistry.....	Blacksburg, Va.
Lutz, Prof. Robert E., Chemistry.....	Chemical Laboratory, University, Va.
Lyons, Dr. Harry, Dentistry.....	Professional Bldg., Richmond, Va.
Magruder, Mr. E. W., Chemistry.....	F. S. Royster Guano Co., Norfolk, Va.
Main, Dr. Rolland J., Physiology.....	Medical College of Virginia, Richmond, Va.
Mallory, Col. Francis, Physics.....	Box 845, Lexington, Va.
Manahan, Dr. J. L., Education.....	33 University Place, University, Va.
Mankin, Mr. W. Douglas, Biology.....	Herndon, Va.
Manning, Mr. Leslie D., Geology.....	905 Poplar Hill Rd., Roland Park, Baltimore, Md.
**Marcuse, Mr. I. J.....	2213 Monument Avenue, Richmond, Va.
Martin, Dr. Charles K., Education.....	7100 Hampton Blvd., Norfolk, Va.
Martin, Miss Haydee, Biology.....	S. T. C., Radford, Va.
Martin, Dr. Mabel F., Psychology.....	Richmond Professional Institute, Richmond, Va.
Martin, Dr. Walter B., Medicine.....	339 Boush Street, Norfolk, Va.
Masi, Mr. Joseph F., Chemistry.....	Box 111, Blacksburg, Va.
Mason, Mr. George C., Biology.....	1015 Blair Avenue, Hampton, Va.
Mason, Dr. Ruth S., Medicine.....	431 W. Washington St., Petersburg, Va.
Mason, Dr. W. Roy, Jr., Medicine.....	1919 Thomson Road, University, Va.
Massey, Prof. A. B., Botany.....	Blacksburg, Va.
Matthew Fontaine Maury Sci. Club.....	Mary Washington College, Fredericksburg, Va.
Matthews, Prof. A. A. L., Geology.....	V. P. I., Blacksburg, Va.
Mayo, Miss Betty, Chemistry.....	S. T. C., Radford, Va.
McCay, Dr. Myron S., Physics.....	Box 339, Blacksburg, Va.
McConnell, Mr. H. K., Chemistry.....	Box 726, Richmond, Va.
McCorkindale, Miss Frances L., Med. Tech.....	S. T. C., Radford, Va.
McCorkle, Mr. T. A., Chemistry.....	303 First Avenue, Farmville, Va.
McCormack, Mr. John T., Geology.....	V. P. I., Blacksburg, Va.
McCormick, Miss Gwendolyn, Home Ec.....	243 W. High Street, Elkton, Md
McCrackan, Prof. Robert F., Biochem.....	Medical College of Virginia, Richmond, Va.
McCrackan, Mrs. Robert F., Botany.....	1005 W. Franklin St., Richmond, Va.
McGauhey, Prof. P. H., Engineering.....	Blacksburg, Va.
McGavock, Mr. Cecil B., Jr., Geology.....	202 Pound Bldg., Chattanooga, Tenn.
McGill, Mr. Wm. M., Geology.....	6 Wayside Place, Charlottesville, Va.
McGinnis, Dr. John M., Psychology.....	Hollins College, Va.
**McGuire, Mr. M. M.....	Mutual Bldg., Richmond, Va.
McGuire, Dr. Stuart, Surgery.....	1008 W. Grace Street, Richmond, Va.
McIntee, Mr. James F., Jr., Conservation.....	Quantico, Va.

McNeal, Prof. M. J., Mathematics.....	Randolph-Macon College, Ashland, Va.
McShane, Mr. E. J., Mathematics.....	Box 1636, University, Va.
Meacham, Mr. Wm. S., Psychology.....	Times-Dispatch, Richmond, Va.
Meade, Richard A., Education.....	38 University Circle, Charlottesville, Va.
*Medical College of Virginia.....	Richmond, Va.
Menzel, Mr. Winston, Biology.....	Va. Fisheries Laboratory, Yorktown, Va.
Merrymon, Dr. Wm. Walter, Physics.....	P. O. Box 816, Williamsburg, Va.
Messer, Mr. Richard, Sanit. Eng.....	State Dept. of Health, Richmond, Va.
Meyers, Mr. Herbert H., Chem. Eng.....	V.-C. Chem. Corp., Richmond, Va.
Michaux, Dr. Stuart, Gynecology.....	Stuart Circle Hospital, Richmond, Va.
Miller, Dr. C. O., Microscopy.....	New Market, Va.
Miller, Dr. E. C. L.....	Medical College of Virginia, Richmond, Va.
Miller, Dr. E. DeWitt, Cytology.....	Box 388, Madison College, Harrisonburg, Va.
Miller, Mr. E. T., Chemistry.....	1515 W. 19th Street, Richmond, Va.
Miller, Dr. James S., Mathematics.....	Box 34, Emory, Va.
***Miller, Mr. John M., Jr.....	First & Merch. Nat. Bank, Richmond, Va.
Miller, Mr. Robert L., Pharmacy.....	Christiansburg, Va.
Miller, Miss Vada C., Biology.....	Box 378, Front Royal, Va.
Miller, Dr. W. Schuyler, Chemistry.....	Box 202, Ashland, Va.
Milne, Dr. Lorus J., Zoology.....	R.-M. W. College, Lynchburg, Va.
Mitchell, Dr. S. A., Astronomy.....	University, Va.
Moody, Mr. W. L., Chemistry.....	Va. Testing Laboratory, Richmond, Va.
Moran, Miss Sarepta A., Psychology.....	Charlottesville, Va.
Moreland, Dr. J. Earl, Education.....	R.-M. College, Ashland, Va.
Morenus, Dr. Eugenie M., Mathematics.....	Sweet Briar, Va.
Morris, Mr. John S., Jr., Medicine.....	Med. Coll. of Va., Richmond, Va.
Morrison, Mr. Robt. H., Chem. Eng.....	4121 Crestwood Road, Richmond, Va.
Moseley, Mr. John M., Chemistry.....	311 S. Boulevard, Richmond, Va.
Mull, Dr. Helen K.....	Sweet Briar College, Sweet Briar, Va.
Mullin, Mr. Robert S., Phytopathol.....	Box 127, Blacksburg, Va.
Mundie, Dr. J. R., Botany.....	King College, Bristol, Tenn.
Murray, Dr. J. J., Ornithology.....	6 White Street, Lexington, Va.
Murray, Prof. W. A., Electronics.....	Box 2, Blacksburg, Va.
Myers, Dr. C. E., Education.....	512 State Office Bldg., Richmond, Va.
Myers, Dr. Hugh I., Physiology.....	University of Richmond, Va.
Negus, Dr. Sidney S., Chemistry.....	Medical College of Virginia, Richmond, Va.
Nelson, Mr. Robert F., Psychology.....	R. F. D. 2, Glen Allen, Va.
Nelson, Mrs. Rowland W., Geology.....	Davidson Park, Lexington, Va.
Nelson, Prof. Wilbur A., Geology.....	3133 Connecticut Ave., Washington, D. C.
Nemuth, Dr. Harold I., Medicine.....	617 West Grace Street, Richmond, Va.
Newcomb, Dr. John Lloyd.....	University, Va.
Newcombe, Dr. Curtis L., Biology.....	Williamsburg, Va.
Newman, Mr. Clarence W., Geog.....	Va. State Chamber of Commerce, Richmond, Va.
Newman, Lt. James B., Physics.....	Va. Military Institute, Lexington, Va.
Nickels, Mr. Wm. I., Jr., Physics.....	307 Ridge Street, Charlottesville, Va.
Nofsinger, Mr. Warner W., General Science.....	Box 2433, Roanoke, Va.
Nolting, Mr. Carl H., Biol.....	Comm. Game & Inland Fisheries, Richmond, Va.
Norris, Dean Earle B., Engineering.....	Box 26, V. P. I., Blacksburg, Va.
Obenshain, Dr. S. S., Geology.....	Blacksburg, Va.
O'Brien, Mr. R. E., Agronomy.....	Va. Experiment Station, Blacksburg, Va.
O'Byrne, J. W., Forestry	V. P. I., Blacksburg, Va.
Oglesby, Prof. E. J., Mathematics.....	University, Va.
Oglesby, Miss Mary C., Biology.....	Draper, Va.
Oliver, Mr. George J., Education.....	4800 Stuart Avenue, Richmond, Va.
Oliver, Miss Lois, Home Ec.....	Madison College, Harrisonburg, Va.
Olivier, Dr. Chas. P., Astron.....	Flower Observatory, U. of Pa., Upper Darby, Pa.
Olsson, Mr. Elis, Engineering.....	The Chesapeake Corp., West Point, Va.
Opie, Col. Hierome L., Conserv.....	Leader Publishing Co., Staunton, Va.

Orgain, Mr. Clarence T., Chemistry.....	Alberta, Va.
O'Shaughnessy, Dr. Louis, Mathematics.....	Box 177, Blacksburg, Va.
Osterud, Dr. H. L., Biology.....	Medical College of Virginia, Richmond, Va.
Overcash, Mr. H. B., Physics.....	Hampden-Sydney, Va.
Overton, Mr. Edward F., Education.....	820 Mercer Street, Fredericksburg, Va.
Owen, Dr. Benton, Chemistry	Yale University, New Haven, Conn.
Owen, Mr. H. Malcolm, Biology	608 Somerset Avenue, Richmond, Va.
Park, Miss Nellie.....	Madison College, Harrisonburg, Va.
Parkins, Mr. John H., Chemistry.....	288 Bank Street, Norfolk, Va.
**Parrish, Mr. J. Scott.....	Amer. Nat. Bk., Bldg., Richmond, Va.
Partlow, Mr. Benj. W., Chemistry.....	Box 21, Bedford, Va.
Patterson, Dr. Paul M., Botany.....	Hollins College, Va.
Peabody, Dr. William A., Biochem.....	2510 Hawthorne Avenue, Richmond, Va.
Peak, Dr. Helen, Psychology.....	R.-M. W. College, Lynchburg, Va.
Pearson, Mr. John C., Biology.....	U. S. Fish & Wildlife Service, College Park, Md.
Peery, Prof. G. G., Biology.....	Roanoke College, Salem, Va.
Pegau, Dr. A. A., Mineralogy.....	Rugby Road, Rosser Lane, University, Va.
Perice, Mr. Allan S., Phytopath.....	Box 126, M. W. Coll., Fredericksburg, Va.
Pence, Capt. J. Worth, Education.....	Staunton Military Academy, Staunton, Va.
Perrow, Dr. Mosby G., Public Health.....	Lynchburg, Va.
Perry, Mr. Bruce A., Genetics.....	Blandy Experimental Farm, University, Va.
Pettit, Capt. L. C., Biology	Hq. 302d Infantry, APO 94, Fort Custer, Mich.
Pettit, Miss Ruth V., Chemistry.....	Rustburg, Va.
Phillips, Dr. Ruth L., Embryology.....	Madison College, Harrisonburg, Va.
Phillips, Dr. W. J., Entomology.....	718 Cargil Lane, Charlottesville, Va.
Phipps, Mr. Morris, Medicine.....	10 W. Main Street, Richmond, Va.
Pierce, Dr. J. Stanton, Chemistry.....	813 Roseneath Road, Richmond, Va.
Pillans, Miss Helen M., Physics.....	311 Norfolk Avenue, Richmond, Va.
Pitt, Miss Lynde A., Biology.....	3215 Patterson Avenue, Richmond, Va.
Pitts, Prof. Frank P., Chemistry.....	Medical College of Virginia, Richmond, Va.
Pletta, Prof. D. H., Mechanics.....	Box 417, Blacksburg, Va.
Podtiaguine, Mr. Michael P., Physics.....	20 Elliewood Avenue, University, Va.
Poindexter, Mr. G. R., Jr., Medicine.....	Fredericks Hall, Va.
Pomeroy, Mr. Hugh R., Mathematics.....	6426 Roselawn Road, Richmond, Va.
Poos, Dr. Frederick W., Entomol.....	Beltsville Research Center, Beltsville, Md.
Porter, Mr. H. C., Agronomy.....	Box 7, Bland, Va.
Porter, Dr. William B., Medicine.....	Medical College of Virginia, Richmond, Va.
**Powers & Anderson.....	603 E. Main Street, Richmond, Va.
Pownall, Mr. L. H.	Amer. Viscose Corp., Roanoke, Va.
Pratt, Miss Dorothy I., Educ.....	Box 276, R.-M. W. College, Lynchburg, Va.
Priest, Mr. John J., Chemistry.....	4227 Faquier Avenue, Richmond, Va.
Prince, Dean Wm. L. Education.....	University of Richmond, Va.
Pulliam, Mr. Matthew, Medicine.....	Leesburg, Va.
Purdie, Lt. Col. K. S., Math.....	313 Letcher Ave., Lexington, Va.
Pusey, Dr. Leo Arthur, Dentistry.....	301 E. Grace St., Richmond, Va.
Ra'ston, Mr. William, Chemistry.....	Box 726, Richmond, Va.
*Randolph-Macon Woman's College.....	Lynchburg, Va.
Raskins, Dr. Evelyn, Psycholoy.....	Apt. 41, 713 19th St., N. W., Washington, D. C.
Ratzlaff, Mr. Alvin L., Physics.....	Quarters 308-B, Marine Bar., Quantico, Va.
Ray, Mr. Charles, Jr., Biology.....	Central Fiber Corp., Pisgah Forest, N. C.
Raynor, Prof. C. H., Physics	Box 589, Salem, Va.
Rector, Miss Helen V., Physics.....	Fairfax, Va.
Reed, Mr. Charles L., Engineering.....	% Larus & Bros. Co., Inc., Richmond, Va.
Reed, Miss Mary Frances, Psychology.....	Box 843, Blacksburg, Va.
*Reed, Mr. P. L.	1418 Grove Avenue, Richmond, Va.
Reed, Mr. W. D., Entomology.....	17 N. Boulevard, Richmond, Va.
Reeves, Lt. D. B., Physics	Virginia Military Inst., Lexington, Va.
Reed, Dr. J. Douglas, Bacter.....	University Height, R. F. D., 13, Richmond, Va.

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Reitz, Mr. John E., Biology.....	1414 Gordon Avenue, Charlottesville, Va.
Rennie, Mr. C. B., Agriculture.....	1409 Wilmington Avenue, Richmond, Va.
Reuyl, Dr. Dirk, Astronomy.....	University, Va.
Reynolds, Dr. Bruce D., Protozoology.....	University, Va.
Reynolds, Miss Catherine, Gen. Science.....	223 Randolph Avenue, Danville, Va.
Rhyne, Dr. Hugh J., Education.....	Marion, Va.
Rice, Miss Alva W., Biology.....	Shenandoah College, Dayton, Va.
Richardson, Prof. W., Physics.....	Box 203, V. P. I., Blacksburg, Va.
Rickard, Mr. H. L., Geology.....	1111 Holliday, Wichita Falls, Texas
Riese, Dr. Hertha, Psychology.....	501 N. Allen Ave., Apt. 48, Richmond, Va.
Riese, Dr. Walther, Neurology.....	Medical College of Virginia, Richmond, Va.
Riley, Miss Connie.....	Madison College, Harrisonburg, Va.
Risley, Miss A. Marguerite, Math.....	Box 63, R.-M. W. College, Lynchburg, Va.
Rivera, Miss Irma Hope, Biology.....	Box 152, S. T. C., Radford, Va.
Rivera, Miss Nadine, Biology.....	S. T. C., Radford, Va.
Robb, Mr. J. Bernard, Chemistry.....	213 East Broad Street, Richmond, Va.
Robb, Dr. Robert G., Chemistry.....	College of William & Mary, Williamsburg, Va.
Roberts, Mr. D. B., Agriculture.....	Route 3, Box 144-A, Norfolk, Va.
Roberts, Dr. Joseph K., Geology.....	Box 471, University, Va.
Robertson, Miss Katherine.....	Madison College, Harrisonburg, Va.
Robertson, Miss Purcell M., Biology.....	S. T. C., Radford, Va.
Robeson, Dr. F. L., Physics.....	V. P. I., Blacksburg, Va.
Robey, Dr. Ashley, Chemistry.....	105 Lewis Avenue, Salem, Va.
Rodman, Prof. Walter S., Mathematics.....	Box 1476, University, Va.
Rogers, Mr. D. A., Chemistry.....	The Solvay Process Co., Hopewell, Va.
Root, Mr. Robert W., Geology.....	Washington & Lee University, Lexington, Va.
Rorer, Dr. John Alex., Education.....	Extension Division, University, Va.
Rosebery, Mr. D. A., Biology.....	V. P. I., Blacksburg, Va.
Ross, Mr. Earl T., Geology.....	709 12th St., N. W., Washington, D. C.
Rosser, Dr. Charles M., Chemistry.....	1606 Franklin Street, Fredericksburg, Va.
Row, Mr. Stuart B., Engineering.....	Box 561, Blacksburg, Va.
Rowe, Dr. T. D., Pharmacy.....	Medical College of Virginia, Richmond, Va.
Royster, Dr. Lawrence T., Pediatrics.....	University, Va.
**Rudd, Dean Wortley F., Pharmacy.....	Medical College of Virginia, Richmond, Va.
Rushton, Mr. J. H., Engineering.....	1306 Rugby Road, Charlottesville, Va.
Russell, Capt. Edgar V., Jr., Chemistry.....	Seattle, Wash.
Ryland, Dr. Garnett, Chemistry.....	University of Richmond, Va.
Ryman, Mr. Jacob F., Physics.....	Box 147, Blacksburg, Va.
Samuel, Mr. Boyd L., Chemistry.....	1121 State Office Bldg., Richmond, Va.
Sanders, Mr. H. W., Education.....	Box 79, Blacksburg, Va.
Sandholzer, Dr. Leslie A., Public Health.....	Box 1834, Norfolk, Va.
Sanford, Mr. R. M., Photography.....	Va. State Planning Bd., Richmond, Va.
Sanger, Dr. Wm. T., Education.....	Medical College of Virginia, Richmond, Va.
Varver, Dr. L. A., Chemistry.....	1227 White Oak Rd., Roanoke, Va.
Scherer, Dr. J. H., Hematology.....	Medical College of Virginia, Richmond, Va.
Scherer, Dr. Philip C., Jr., Chemistry.....	Box 209, Blacksburg, Va.
Schneider, Dr. Joseph Z., Chemistry.....	3422 Carpenter St., S. E., Washington, D. C.
Schoenbaum, Mr. Alex. W., Tobacco.....	400 Petersburg Pike, Richmond, Va.
Schoene, Dr. Wm. J., Entomology.....	Blacksburg, Va.
Schofield, Miss Frances, Chemistry.....	R.-M. W. College, Lynchburg, Va.
Schultz, Miss Helen H., Chemistry.....	Box 105, M. W. College, Fredericksburg, Va.
Schumacher, Mr. J. D., Chemistry.....	American Viscose Corp., Roanoke, Va.
Scott, Dr. Ernest G., Medicine.....	725 Church Street, Lynchburg, Va.
Scott, Dr. James K., Medicine.....	Colonnade Club, University, Va.
Scribner, Mr. A. Kenneth, Chem.....	201 Park Road, Glensocallah, Portsmouth, Va.
Sears, Mr. C. E., Jr., Geology.....	Salem, Va.
Selner, Mr. Leroy, Honorary Member.....	Pulaski High School, Pulaski, Va.
Seltzer, Prof. L. Z., Engineering.....	Box 793, V. P. I., Blacksburg, Va.
Sette, Prof. F. J., Chemistry.....	Apt. 507, 4701 Conn. Ave., N. W., Wash., D. C.

Shadwell, Mr. Lemuel R., Pharmacy.....	2800 W. Broad Street, Richmond Va.
Shear, Dr. G. M., Botany.....	Box 112, Blacksburg, Va.
Shearburn, Dr. Edwin, Surgery.....	308 Park Place, Charlottesville, Va.
Shedd, Miss Dorothy.....	St. Anne's School, Charlottesville, Va.
Shelburne, Mr. L. F., Education.....	Box 359, Staunton, Va.
Shepherd, Miss Sibyl A., Home Ec.....	S. T. C., Radford, Va.
Sherwood, Mr. C. S., III, Chemistry.....	111 West Road, Portsmouth, Va.
Showalter, Dr. A. M., Biology.....	Madison College, Harrisonburg, Va.
Simmons, Miss Martha.....	Madison College, Harrisonburg, Va.
Simmons, Mr. J. W., Jr., Astronomy.....	V. P. I., Blacksburg, Va.
Simms, Dr. Reuben F., Medicine.....	211 W. Grace Street, Richmond, Va.
Simons, Prof. E. M., Engineering.....	Box 687, V. P. I., Blacksburg, Va.
Simpson, Mr. John C., Education.....	Stratford College, Danville, Va.
Simpson, Prof. Palmer M., Chemistry.....	Hampden-Sydney, Va.
Simpson, Dr. R. L., Jr., Dentistry.....	Medical College of Virginia, Richmond, Va.
Simpson, Dean T. McN., Jr., Mathematics.....	Ashland, Va.
Sisson, Miss Lucy K., Chemistry.....	4028 Fauquier Avenue, Richmond, Va.
Sitler, Prof. Ida, Biology.....	Hollins College, Va.
Smart, Dr. Robert F., Mycology.....	Box 108, University of Richmond, Va.
Smart, Mr. A. Lee, Mathematics.....	619 W. 28th Street, Norfolk, Va.
Smith, Miss Catherine A., Chemistry.....	319 N. Quincy Street, Arlington, Va.
Smith, Dr. D. C., Medicine.....	P. O. Box 1516, University, Va.
Smith, Mr. Edmund A., Engineering.....	103 Gun Club Road, Richmond, Va.
Smith, Mr. Foley F., Chemistry.....	A. B. C. Board, Richmond, Va.
Smith, Dr. Harold H., Genetics.....	Arlington Exper. Farm, Arlington, Va.
Smith, Dr. James H., Medicine.....	1008 W. Grace Street, Richmond, Va.
Smith, Miss Lelia H., Mathematics.....	S. T. C., Radford, Va.
Smith, Mr. LeRoy H., Chemistry.....	Viscose Corp. of Virginia, Roanoke, Va.
Smithey, Dr. William R., Education.....	40 University Place, University, Va.
Sniffen, Mr. Ernest W., Geology.....	3111 Chesapeake Avenue, Hampton, Va.
Snoddy, Mr. Leland B., Physics.....	University, Va.
Sommerville, Dr. R. C., Psychology.....	307 Vernon St., Lynchburg, Va.
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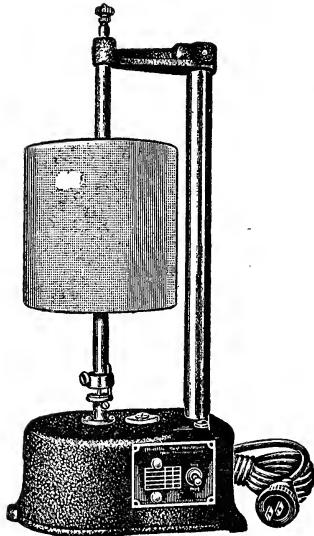
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